**Severe Weather Forecasting Demonstration Project (SWFDP)**

**Regional Subprojects for Southeast Asia (SeA) and Bay of Bengal (BoB)**

**Training Workshop on**

**Severe Weather Forecasting (GDPFS) and Warning Services (PWS)**

(Bangkok, Thailand, 14-25 September 2015)

**Provisional Programme for Week-1 (14-19 September 2015)**

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| **Day 1: Monday, 14 September 2015** |
| 09:00-09:30 | **Registration** | All  |
| 09:30-09:55 | **Opening Ceremony*** Welcome Remarks by local host
* Message by WMO
* Introduction by the participants and lecturers
 | TMD AH (WMO) (*25 min)* |
| 09:55-10:00 | **Group Photo** | All  |
| 10:00-10:30 | *Coffee/ Tea Break* |  |
| 10:30-10:45 | **WMO GDPFS and its future vision** | AH (WMO) (*15 min)* |
| 10:45-11:00 | **An Overview of the SWFDP and its Regional Subprojects including SWFDP- SeA& SWFDP-BoB** | AH (WMO) (15 *min)* |
| 11:00-11:45 | **SWFDP-SeA Website and portal (RFSC Ha Noi) (Interactive Demo)** | DDT (45 min) |
| 11:45-12:30 | **SWFDP-BoB Website and portal (RSMC New Delhi) (Interactive Demo)** | DRP(IMD)*(45 min)* |
| 12:30-13:30 | *Lunch Break* |  |
| 13:30-13:45 | Current weather discussion  | TMD *(15 min)* |
| 13:45-15:00 | **Country Presentations:** **Major Hazards in Southeast Asia, and Forecasting Capabilities and Warning Systems in each country*** Cambodia, Lao PDR, Philippines, Viet Nam and Thailand
 | Participants *(15 min for each participant)* |
| 15:00-15:30 | Verification Why Verification of forecast? Work assignment | LW (30 *min)* |
| *15:30-16:00* | *Coffee/ Tea Break* |  |
| 16:00-18:00 | **Country Presentations:** **Major Hazards in Bay of Bengal region, and Forecasting Capabilities and Warning Systems in each country*** Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan and Sri Lanka
 | Participants *(15 min for each participant)* |

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| **Day 2: Tuesday, 15 September 2015** |
| 09:00-09:45 | **Numerical Weather Prediction (NWP) Process and EPS Concepts*** NWP Process - basics on data assimilation, model physics and resolution; and EPS Concepts
 | YO (JMA)(*45 min)* |
| 09:45-10:30 | Global NWP models and their products for SWFDP* Overview andavailability of global NWP model products (access demo), strengths and weaknesses (KMA, NOAA/NCEP and ECMWF model) (products available for SWFDP-SeA)
 | DDT (RFSC) (45 *min*) |
| 10:30-11:00 | *Coffee/ Tea Break* |  |
| 11:00-11:45 | * Overview and availability of global NWP model products (access demo), strengths and weaknesses (JMA model) (products available for SWFDP-SeA)
 | YO (JMA) *(45 min)* |
| 11:45-12:30 | * Overview and availability of global NWP model products (access demo), strengths and weaknesses (CMA model) (products available for SWFDP-SeA)
 | QZ (CMA) (45 min) |
| 12:30-13:30 | *Lunch Break* |  |
| 13:30-13:45 | Current weather discussion  | TMD *(15 min)* |
| 13:45-14:15 | Statistical adaptation of NWP products | LW (*30 min)* |
| 14:15-14:45 | **Regional NWP/Limited Area Model (LAM)** * Operational aspects: boundary conditions, topography, local surface and upper air observations, LAM data assimilation, integration (time constraints), availability, strengths and weaknesses;
* Regional EPS availability, strengths and weaknesses;
* Regional products
 | DDT (RFSC)(30 min) |
| 14:45-15:30 | Atmospheric Stability* Introduction to concepts and products used for atmospheric stability
* Specific products (diagnosis of deep convection): K-Index, Total Totals Index, Lifted Index, Vertical Velocity, CAPE, Precipitable water, Theta-E/Theta-SE, CIN
* Using GFS and LAM vertical profiles
 | LW (45 min) |
| *15:30-16:00* | *Coffee/ Tea Break* |  |
| 16:00-16:45 | **Global and Regional NWP models and their products for SWFDP-BoB*** Overview and availability of NWP products from global and regional models implemented at IMD and NCMRWF (access demo), strengths and weaknesses (products available for SWFDP-BoB)
 | DRP (IMD)*(45 min)* |
| 16:45-18:00 | ***Severe Weather Forecast Exercise 1*– Use of NWP and EPS products in Severe weather forecasting including preparing country forecasts for Medium-range (3 to 5 Days)*** Hands – on session

The Best practice for Severe Weather Forecasting: Use of NWP & EPS products for forecasting severe weather. Practicality: use of Global Models: deterministic and EPS; Diagnostic tools for Severe weather forecasting & early warnings; best use of LAM & products from RSMCs and RFSC, for monitoring, and forecasting severe weather to provide alerts warnings. To prepare country forecasts for Medium-range  | DRP (IMD) (lead)QZ (CMA)YO (JMA)DDT (RFSC)LWTMD/Participants (75 *min)* |

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| **Day 3: Wednesday, 16 September 2015** |
| 09:00-09:45 | Use of NWP models and products in support of severe weather forecasting during monsoon and pre-monsoon seasons* Applications of global model products in severe weather forecasting during monsoon and pre-monsoon seasons
* Model guidance, probabilistic products and post-processing techniques of global and mesoscale NWP models
 | DRP (IMD)*(45 min)* |
| 09:45-10:30 | Nowcasting using radar products and very short range forecasts of severe weather * Nowcasting basics (radar QPE/QPF)
* Combining NWP model products in very short range forecasts of severe weather including heavy rain and flash floods
 | XY (CMA) (*45 min)* |
| 10:30-11:00 | Coffee/ Tea break |  |
| 11:00-12:30 | ***Severe Weather Forecast Exercise 2*– Radar Nowcasting and very short range forecasting** * Hands – on session

The Best practice for Severe Weather Forecasting: Radar nowcasting and very short range forecasts of severe weather including heavy rain and flash floods in combining with NWP models. To prepare forecasts for next few hours | XY (CMA) (lead)/Participants (90 *min)* |
| 12:30-13:30 | *Lunch Break* |  |
| 13:30-14:30 | Tour to the TMD Forecasting Office and current weather discussion  | TMD*(60 min)* |
| 14:30-15:30 | Ensemble Prediction Systems and Probabilistic Forecasting * General probability concepts for forecasting
* JMA probability charts and EPSgrams
* Forecaster decision-making process blending EPS and deterministic forecasts
 | YO (JMA)*(60 min)* |
| 15:30-16:00 | Coffee/ Tea break |  |
| 16:00-16:45 | **Webinar: Forecasting Severe Events, ECMWF Extreme Forecast Index (EFI), probability charts &EPSgrams** | AG (ECMWF)*(45 min)* |
| 16:45-18:00 | ***Severe Weather Forecast Exercise 3*– Short-range Forecasting including preparing country forecasts for Day 1 & Day 2*** Hands-on session

The Best practice for Severe Weather Forecasting: Use of NWP and satellite observations for monitoring and short-range forecasting of severe weather. Practicality: Best use of products from RFSC Hanoi & RSMC New Delhi. To prepare country forecasts for Day 1 & Day 2 | DRP (IMD) (to lead)LW QZ (CMA)YO (JMA)DDT(RFSC)TMD/Participants(75 min) |
| **Day 4: Thursday, 17 September 2015** |
| 09:00-09:45 | Nowcasting using satellite products * Satellite basics
* Image data processing and interpretation
 | XF (CMA)*(45min)* |
| 09:45-10.45 | Webinar: JMA’s Himawari-8 satellite and its RBG products | NM (JMA) &AS(JMA)(60 min) |
| 10:45-11:00 | Coffee/ Tea break |  |
| 11:00-12:30 | Combining NWP, satellite, conceptual models in forecasting* Concepts and examples
* Structures approach to analyse products and prepare forecasts
 | XF (CMA)*(90 min)* |
| 12:30-13:30 | *Lunch Break* |  |
| 13:30-13:45 | Current weather discussion  | TMD *(15 min)* |
| 13:45-14:45 | ***Severe Weather Forecast Exercise 4*– Satellite Nowcasting and Very Short-range Forecasting** * Hands-on session

The Best practice for Severe Weather Forecasting: Satellite nowcasting and use of NWP products and satellite observations for monitoring and very short-range forecasting of severe weather. Practicality: Best use of satellite products, best use of products from RFSC Hanoi & RSMC New Delhi. To prepare forecasts for next 6 to 12 hours. | XF (CMA)(to lead)/Participants (60 *min)* |
| 14:45-15:30 | **Typhoon forecasting including analysis, products and tools** | MY (JMA)*(45 min)* |
| 15:30-16:00 | *Coffee/ Tea Break* |  |
| 16:00-16:45 | **Detecting and monitoring hazardous weather*** Severe weather in Southeast Asia and Bay of Bengal regions, seasons, physical climatology
* Real-time observations

Using NWP/EPS Guidance for forecasting severe weather –products from RFSC Hanoi & RSMC New Delhi | TMD &DRP (IMD)*(45 min)* |
| 16:45-18:00 | ***Severe Weather Forecast Exercise 5*– Use of NWP and EPS products in Severe weather forecasting as well as preparing Country forecasts for Short-range (Day 1 & Day 2) and Medium-range (3-5 Days)*** Hands – on session

The Best practice for Severe Weather Forecasting: Use of NWP & EPS products for forecasting severe weather. Practicality: use of Global Models: deterministic and EPS; Diagnostic tools for Severe weather forecasting & early warnings; best use of LAM & products from RSMCs and RFSC, observational data for monitoring, and forecasting severe weather in Southeast Asia to provide alerts warnings. To prepare country forecasts for short-range (Day 1 & Day 2) and Medium-range (out to 5 days) (training of trainers exercise) | MY (JMA) (to lead)DRP (IMD) QZ (CMA)DDT (RFSC)LWTMD/ Participants*(90 min)* |
| **Day 5: Friday, 18 September 2015** |
| 09:00-09:45 | **Webinar: Storm surge forecasting**  | NK (JMA)*(45 min)* |
| 09:45-10:30 | **Tropical cyclone forecasting including analysis, products and tools** | DRP (IMD) *(45 min)* |
| 10:30-11:00 | Coffee/ Tea break |  |
| 11:00-12:30 | **Reports on practical exercises by the participants** (How they prepared the forecast, what products they used, assessment of the quality of forecast etc.) (to continue after lunch also) | DRP (IMD) (to lead) /Participants *(90 min)* |
| 12:30-13:30 | *Lunch Break* |  |
| 13:30-13:45 | Current weather discussion  | TMD *(15 min)* |
| 13:45-14:30 | **Reports on practical exercises by the participants** (How they prepared the forecast, what products they used, assessment of the quality of forecast etc.) | QZ (CMA) (to lead)/Participants *(45 min)* |
| 14:30-15:30 | Verification * Verifying forecasts and warnings including TC verification
* SWFDP verification tasks and interpretation of results
 | LW (60 *min)* |
| 15:30-16:00 | *Coffee/ Tea Break* |  |
| 16:00-16:30 | **How to prepare Case study for SWFDP-BoB& SWFDP-SeA, example** | LW (30) *min)* |
| 16:30-18:00 | ***Severe Weather Forecast Exercise 6 - V*erification of country forecasts and nowcasting over Southeast Asia and Bay of Bengal regions**Hands-on session  | LW (*to assist)* /Participants *(90 min)* |
| **Day 6: Saturday, 19 September 2015** |
| 09:00-09:15 | SWFDP database (demonstration)* Access to SWFDP database
* Quarterly Progress Report key elements and submission of progress reports on-line through SWFDP database
 | AH (WMO) *(15 min)* |
| 09:15-10:30 | **Discussion: Implementing SWFDP in Southeast Asia and Bay of Bengal*** Management, schedule feedback and organization
* Operational implementation and use of products
* Recommendations to improve the Project Web Portal
* Training of other forecasters
* Roles of the national focal points
* How to enhance in-country application of SWFDP
* SWFDP Database and reporting
* Integration of SWFDP with FFGS
 | AH (WMO)LW/Participants *(75 min)* |
| 10:30-11:00 | *Coffee/ Tea Break* |  |
| 11:00-12:00 | **Solution to the Verification exercise**  | LW (60 *min)* |
| 12:00-12:20 | **Complete WMO Training Workshop Questionnaire (GDPFS)** (Review the achievements of training) | Participants *(20 min)* |
| 12:20-12:30 | **Closing remarks** | TMD AH (WMO)(10 *min)* |
| 12:30-13:30 | *Lunch*  |  |

**Lecturers /Experts**

LW– MrLaurie Wilson (WMO Consultant)

DDT – Mr Du Duc Tien (RFSC –Ha Noi)

XY – Prof Xiaoding Yu (CMA)

QZ – Mr Qingliang Zhouas (CMA)

XF – Mr Xiang Fang (CMA)

DRP – Dr D.R. Pattaniak (IMD)

YO – MrYoichiro Ota (JMA )

MY– Mr Masayuki Yoshimatsu (JMA)

TMD – Thai Meteorological Department (TMD) experts

**Lecturers for Webinars**

AG – Anna Ghelli (ECMWF)

NM – Nobutaka MORI (JMA)

AS – Akihiro SHIMIZU (JMA)

NK– MrNadao Kohno (JMA)

**WMO Secretariat**

AH – AbdoulayeHarou, Chief, DPFS Division

PG– Pascale Gomez, Secretary, DPFS Division (for administrative support)