MEMBER REPORT

ESCAP/WMO Typhoon Committee
10th Integrated Workshop

Singapore

26 – 29 October 2015
Kuala Lumpur, Malaysia

CONTENTS

I. Overview of tropical cyclones which have affected/impacted Member's area in 2015

1. Meteorological Assessment (highlighting forecasting issues/impacts)

   Tropical cyclones that develop in the western Pacific Ocean and South China Sea do not have a direct impact on Singapore. However, the cyclones can at times have an indirect effect or influence on the weather in Singapore. Such effects could take the form of rain bands that extend from the tropical cyclone bringing increased instability to the region and enhanced convective activity, and the strengthening and convergence of winds around Singapore and the immediate vicinity. The resulting squall lines move across Singapore and at times bring heavy rainfall and strong surface wind gusts.

   During the 2015 Pacific Typhoon season, there were two occasions in which tropical storms indirectly affected the weather in Singapore.

   Tropical Storm Linfa developed in the Philippines Sea on 2 July 2015, and influenced the wind field in the southern ASEAN region. On 4 July, a squall line developed to the west of Singapore as Linfa was about to make landfall over Luzon Island in the Philippines. The passage of squall line across Singapore brought 44.6mm of rain with wind gust of 37.5knots over Singapore.

   Tropical Storm Vamco made landfall over Da Nang, Vietnam on 14 September 2015, and Singapore felt the indirect effects of Vamco on 15 September 2015. Spells of thundery showers from the late morning and early afternoon affected all parts of Singapore, and this brought 93.0mm of rainfall in western part of Singapore.

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

   It is a challenging task to manage water for both water resource and flood control as these two functions have conflicting interest. Keeping high storage water level is optimal for water resource which may result in increasing the risk of flooding. Accurate, reliable and timely weather forecast will be a good decision support tool to help manage the water resource more efficiently.

3. Socio-Economic Assessment (highlighting socio-economic and DRR issues/impacts)
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4. Regional Cooperation Assessment (highlighting regional cooperation successes and challenges)
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II. Summary of progress in Key Result Areas

TC Members' Report
Summary of Progress in KRAs

Title of item 1: Heavy Rain and Strong Winds Advisory and Warnings

To help alleviate the impact of heavy thundery showers from line squalls, that developed due to the indirect effect of tropical cyclones in the Northwest Pacific including the South China Sea, the Meteorological Service Singapore (MSS) issues heavy rain and strong winds advisory/warnings to relevant government agencies and the public to enhance their preparedness in expectation of the heavy rain/strong wind events. MSS offers a free SMS subscription service which the public can subscribe to so as to receive the heavy rain warnings via short message service (SMS). MSS makes available the warnings on the MSS website at http://www.weather.gov.sg/warning-heavy-rain/, via print and broadcast media platforms

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

Summary Table of relevant KRAs and components (please tick boxes, can be more than one, as appropriate):

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

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TC Members' Report
Summary of Progress in KRAs

Title of item 2:
Study in Enhancement of Heavy Rain Warning Services

In provision of heavy rain warnings forecast, the probability of detection (POD), false alarms ratio (FAR) and lead time are three most important parameters in determining the usefulness of the forecast. Currently, with an average yearly (2011 to 2014) issuances of 160 warnings, the average POD and FAR is around 80% and 55% respectively with the average lead time of 30 minutes.

A study in enhancing MSS' heavy rain warning services for public users is currently being conducted. The aim of the study is to improve the lead time of heavy rain warnings for convective weather to 40 minutes or more, and also to reduce the FAR to below 50% while maintaining a high POD of ~80%.

Past database of atmospheric upper air sounding and rainfall data, from year 1991 to 2012, is used in the study to develop a Heavy Rain Index (HRI). The HRI will indicate the likelihood of a heavy rain event happening for each day. Based on the preliminary verification of the heavy rain warnings issued for the year 2015 (till August) against the HRI, the FAR is reduced to less than 50% and the average lead time has slightly increased to 37 minutes.

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

Nil

Summary Table of relevant KRAs and components (please tick boxes, can be more than one, as appropriate):

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Title of item 3:
New One-stop Weather Information Website and Mobile Weather Website

MSS launched her new weather information website where the public can access more comprehensive real-time and past weather information of Singapore on 20 May 2015. The one-stop website (www.weather.gov.sg) provides authoritative weather forecasts, warnings and advisories of heavy rain, smoke haze and geological hazards, as well as long-term climate statistics of Singapore.

One key feature of the new website is a map display of real-time observations of temperature, rainfall, humidity and surface wind at various locations across the island. These weather elements are measured continuously by MSS' island-wide network of over 60+ automatic weather stations. The observations are updated on the website at five minute intervals, giving an indication of where the currently warmest, wettest or windiest parts of the island are. Users can also view graphs that display the trends of rainfall and other elements at selected locations over the course of the day.

Latest information on where rain is falling over Singapore and the surrounding region from the MSS' radar system is also available. Users can also access information on lightning detected over Singapore.

A mobile weather website was subsequently launched on 14 September 2015 to make it easier for users of mobile devices to obtain weather information on the go. Users will be automatically redirected to the mobile website (www.weather.gov.sg/mobile) when they access the weather information website from their mobile phones. The mobile website is customized to the screen size of the mobile phone for ease of use and clarity. The information is also small in data size to enable fast access from mobile networks. Another key feature of the mobile website is the geo-location nowcast. It can detect a user's location to automatically display the 2-hour nowcast for his current location.

MSS is also currently developing weather apps for the Android and Apple iOS platforms which are scheduled to be released later this year.

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

Nil

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Title of item 4: Hydrological Achievements and Results

Over the past decades, Singapore has been improving the drainage infrastructure. The flood-prone areas have been reduced from 3200 ha in the 1970s to about 33 ha today. Singapore continuously reviews and upgrades her drainage infrastructure to ensure an effective drainage network for flood alleviation and prevention.

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

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Title of item 5:
ASEAN Climate Outlook Forum (ASEANCOF)

Background

The ASEAN Climate Outlook Forum (ASEANCOF) was established in 2013, following the strong support given by the 35th Meeting of the ASEAN Sub-Committee on Meteorology and Geophysics (ASCMG) held in Manado, Indonesia (2-4 July 2013) for the proposal for a Regional Climate Outlook Forum (RCOF) in Southeast Asia. The RCOF concept was initiated by the World Meteorological Organization/Climate Information and Prediction Services (WMO/CLIPS) project, in collaboration with National Meteorological and Hydrological Services (NMHSs), regional/international climate centres among many other partners. ASEANCOF aims to provide collaboratively developed and consensus-based seasonal climate outlooks and related information on a regional scale. These activities support decision-making to manage climate-related risks and support sustainable development.

Recent ASEANCOF Sessions

The Third ASEANCOF (ASEANCOF-3) was hosted by the Centre for Climate Research Singapore (CCRS) and was conducted ahead of the December-February (DJF) boreal winter monsoon season of 2014. The recent ASEANCOF-4 meeting was hosted by Indonesian Agency for Meteorology, Climatology and Geophysics (BMKG) for the summer monsoon season of 2015. Both ASEANCOF sessions were well attended with representations from the ASEAN NMHSs, the WMO's Global Producing Centres of Long-Range Forecasts (GPCs), and the end-user community. Also present were representatives from WMO Lead Centre for Long Range Forecast Multi-Model Ensemble (WMO LC-LRFMME) and APEC Climate Centre (APCC). For the purpose of capacity development, international experts were invited to deliver talks on scientific aspects of seasonal predictions and also to provide training during practical workshop sessions. Co-sponsorship and technical support from WMO have been provided for these events.

A thematic approach to ASEANCOF was adopted in 2014 at ASEANCOF-3 where end-users in the region's water sector were invited to provide feedback on the available climate information and to share on the sector's requirements. For ASEANCOF-5, which will again be hosted by CCRS in Nov 2015, the theme on drought management and the associated disaster risk management is proposed.

Detailed meeting reports are available at: http://asmc.asean.org/asmc_asean_conf_about/

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

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Title of item 6:
Participations in Training Workshops, Conferences and Meetings

Singapore participated in several meteorological training workshops/conferences/meetings during the year. Our officers have found the training workshops/meetings educational and beneficial in their course of work. The list of relevant workshops/conferences attended in 2015 are as follows:

- 5th Ministerial Steering Committee (MSC) Technical Task Force (MTTF), 13 Feb 2015, Singapore
- 13th Meeting of APAC Regional OPMET Bulletin Exchange Working Group & 5th Meeting of Asia Pacific Meteorological Hazards Task Force, 16 - 20 Mar 2015, Seoul, Korea
- Regional Forum on Meteorological Services for Aviation Safety in Southeast Asia, 29 - 30 Apr 2015, Jakarta, Indonesia
- 7th International Workshop on Climate Variability and Prediction, 14 - 20 May 2015, Jakarta, Indonesia
- 17th WMO Congress, 25 May - 12 Jun 2015, Geneva, Switzerland
- 9th UM User Workshop and UM User Tutorial, 29 May - 4 Jul 2015, Exeter, UK
- 67th WMO Executive Council, 15 - 17 Jun 2015, Geneva, Switzerland
- ICAO/WMO(MET/ATM) Seminar & the 4th Meeting of the Meteorological Requirements Task Force, 29 Jun - 3 Jul 2015, Tokyo, Japan
- 9th UM User Workshop and UM User Tutorial, 29 May - 4 Jul 2015, Exeter, UK

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

Nil

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