

# **IMPROVEMENT OF METEOROLOGICAL OBSERVATION SYSTEM IN MYANMAR**

By

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## **ABSTRACT**

*The Department of Meteorology and Hydrology (DMH) is under the administration of the Ministry of Transport and Communications. Main works performed by DMH are routine observation and analysis of meteorological phenomena, and providing of timely and accurate weather and climate information through acquisition of weather monitoring and dissemination systems for the general public. DMH also provides meteorological and hydrological information for shipping and aviation as well as agricultural and environment activities. Before Cyclonic Storm "Nargis", (103) surface weather observation stations in Myanmar used manual observing system. As at then, we are improved on installation of Automated Weather Observing Systems at 14 stations including at former Headquarter of National Meteorological Center (NMCs) namely Yangon (Kaba-aye) and new Headquarter of National Meteorological Center (NMCs) namely Nay Pyi Taw.*

*Early months of this year (2016), regarding the Grant Aid Project of Japan, we installed additional Surface Automated Weather Observing Systems (AWS) at existing 30 Meteorological observation stations such as Nay Pyi Taw (Early Warning Center), Yangon (Kaba-aye), Mandalay, Putao, Myitkyina, Bhamo, Lashio, Taunggyi, Kengtung, Namsam, Hakha, Hkamti, Kalay, Monywa, Meikhtila, Magway, Sittwe, Kyauk-phyu, Thandwe, Gwa, Taungu, Bago, Hmawbi, Pathein, Laputta, Loikaw, Hpa-an, Mawlamyine, Dawei and Kawthong. Furthermore, one of the three (3) new Doppler Weather Radars, it is already installed in 2015 and remaining two radars we expected to be completed middle of this year and the project will be complete by next year of 2017. Also calibration training and equipments for Pressure, Precipitation, Humidity, and Thermometer will be installed at the Department's former Headquarters at Yangon (Kaba-aye) during 2016.*

*This work is aimed at disclosing the efforts being made by DMH, Myanmar towards provision of quality data for issuance of accurate weather information and warnings to the public.*

## **1.0. INTRODUCTION**

Automatic Weather Station (AWS) was installed in Myanmar in before 1999 when one number was installed in former head quarter of meteorological office at Yangon. As at that time, Meteorological Observers were familiar with the manually observed instruments whose derived values are calculated by hand and computed with electronic calculator. Then, we had certain

challenges which no experience to handle and observe for using AWS system and also electricity problem to use several days, so that we cannot use daily for recording data.

From the lesson learnt on the failure of the first set of Automatic weather stations, another one set of AWS was introduced in year 2007-2008. This set of AWS is solar powered and has a wireless telemetry whose console could be powered from two sources i.e. A.C. mains or battery. This type of AWS is dependent on the computer to retrieve data for the user and data receiving console can be controlled inside the office room when data is to be downloaded from the logger to the computer for storage. This type of AWS began to gain acceptance to the operators and we succeeded in installing about eight numbers in our networks of stations. Since modernization of Meteorological Instrumentation has made it mandatory for both the operators and the maintenance personnel to have a good knowledge of end-user computing, the Department of Meteorology and Hydrology, Myanmar organized the training for its utilized and after this exercise, operators were no longer scare of computers and it became a useful tool that makes their jobs much easier but we still need the system maintenance and computer knowledge for observers in local observation stations. As of today, not less than forty AWS installed between year 2013 and 2015 are still functioning effectively.

## **2.0 THE INTEGRATED AUTOMATED WEATHER OBSERVING SYSTEM**

In year 2013, the Government of the People Republic of China, through China Meteorological Administration (CMS) donated the five Automation Weather Observation Systems under which the five local observation stations for the implementation of enhance surface weather observing system. These five system was successfully installed and collected the data of the one (1) international airport and four (4) local observation stations, namely Thipaw, Chauk, Mandalay (International Airport), Moenyin and Yangon.

Having extended the system for more than a couple of stations, the Department of Meteorology and Hydrology, Myanmar upgraded for the procurement and installation of Surface Weather Observing System (AWS) for five (5) local observation stations, namely Naypyitaw (New capital city of Myanmar), Mingaladon (Yangon International Airport), Mandalay, Nyaung Oo, Heho, Mawlamyine, Kawthoung, Pyay which were financial supports of the Government Budget.

In 2013, existing (30) observatories upgraded to (30) AWS and will be installed under the JICA, funding supported by Japan Government Grand Aid Project "Establishment of Disastrous Weather Monitoring System. Now (30) AWS stations have already finished. The total grant amount of the project is JPY 4.073 billion (approximately USD 40 million). The project consists of the construction of three (3) Doppler radar tower in Kyauk Phyu, Yangon and Mandalay, and the installation of thirty (30) Automatic Weather Station (AWS) in the country. Both E/N and G/A were signed on 22 March 2013, and it is scheduled to be completed in 2017. Yangon radar tower whose construction started in September 2014 will be completed in 2016, and Mandalay radar tower is planned to be completed in 2017.

The parameters measured by AWS system are more than the conventional automatic weather station which provides Wind Speed, Wind Direction, Pressure, Temperature, Relative Humidity, Dew Point, Sunshine duration and Rainfall.

### **Data Base Interaction**

Data is gathered into an SQL database for analysis by the Delairco Surface Weather Monitor. The results are stored in the SQL database and Delairco Surface Weather Monitor software displays the graphically or text only display.

### **Sensor Stations**

This is a network of ultrasonic sensors for high reliability. The sensor stations require WMO compliant obstruction lights and connection to mains power or solar arrays of adequate capacity to supply LED based obstruction lights.

## **3.0 IMPLEMENTATION OF WEATHER RADAR SYSTEM**

In the 70's, Myanmar had one C-band weather radars that were in operation which was in Kyaukpyu (Coastal of Myanmar). From the mid 1980's to 2015, the Meteorological Service had no single radar system running because the old system went bad in early months of 2008, an attempt was made to repair the system, but this effort failed because of frequent components failure and lack of spare parts to replace defective components.

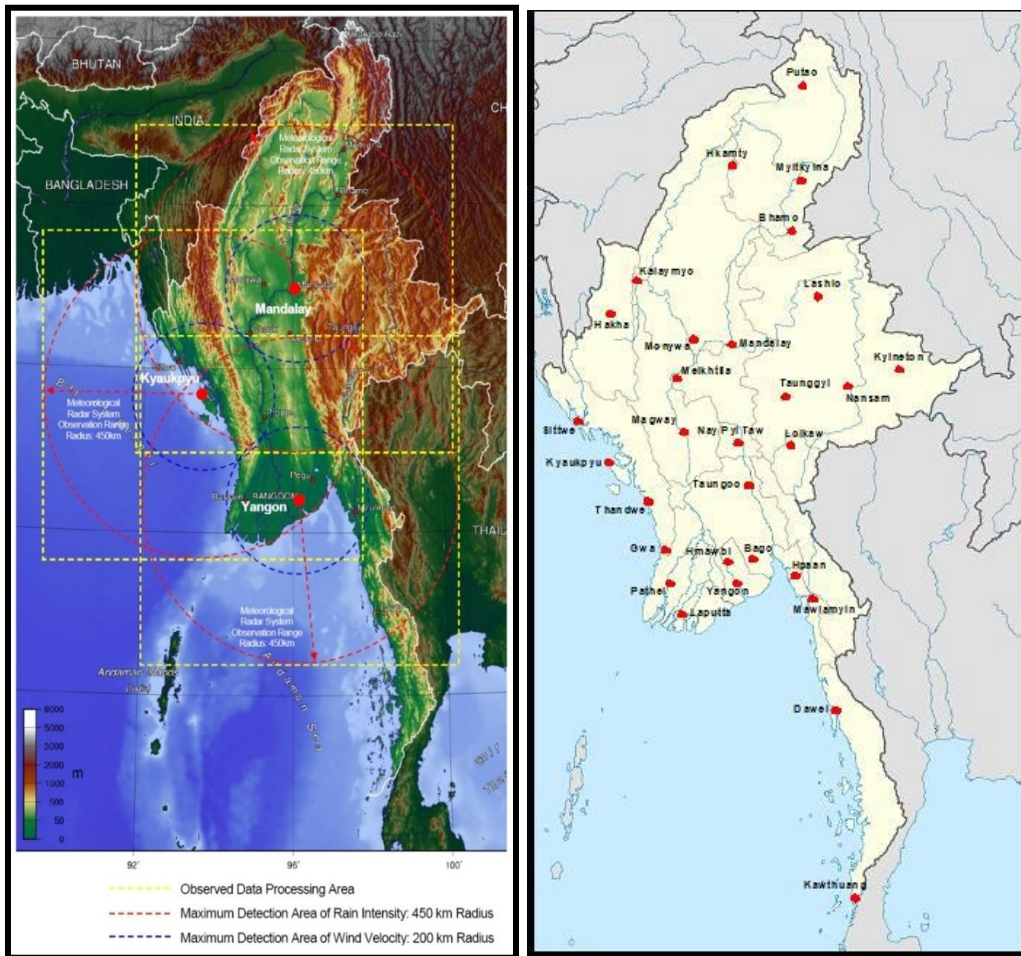
At the Cyclone "Nargis", it became clear that Myanmar required new set of weather radars but a huge amount of money is needed to purchase radar equipment. After Cyclone "Nargis", facts finding mission from World Meteorological Organization (WMO) visited to department and they pointed out that DMH need to install so many facilities for weather observing system including accurate weather forecasting technology such as NWP model. So, Department of Meteorology and Hydrology requested to the Japan Government to assist the (3) radar systems. The request was approved by the Japan Government, through Japan International Cooperation Agency (JICA) the procurement process commenced through an established tender procedure. The contract for the procurement and installation of (3) Doppler Weather Radars and associated (30) AWS was granted to the Taisei Corporation, Japan in 2013. After signing the contract agreement, the Taisei Corporation commenced the building of our Doppler Weather Radar System and (30) AWS stations. As at September, 2015, when the Factory Acceptance Test was conducted, the company has fully built one system meant for Kyaukpyu (Western coast of Myanmar). In July and August 2015, 20 Engineers and Meteorologists were in Nay Pyi Taw, Yangon and Kyauk Pyu, Myanmar for maintenance and utilizing training.

The total grant amount of the project is JPY 4.073 billion (approximately USD 40 million). The project consists of the construction of three (3) Doppler radar tower in Kyauk Phyu, Yangon and Mandalay, and the installation of thirty (30) Automatic Weather Station (AWS) in the country. Both E/N and G/A were signed on 22 March 2013, and it is scheduled to be completed in 2017. Yangon radar tower whose construction started in September 2014 will be completed in 2016, and Mandalay radar tower is planned to be completed in 2017.

The three sites earmarked for the Doppler weather radar systems are Kyaukpyu (Western coast of Myanmar), Yangon (Deltaic areas) and Mandalay (Central Myanmar). Installation of these three has effectively covered the entire country for weather coverage except the extreme Northern and Southern Myanmar areas. Taisei has conducted site survey on each site as well as soil test of the platforms to mount the masts.

At the moment, in Myanmar, one of the three radar systems is already and another one in Yangon will finished on September 2016. The civil works for the mast base in Mandalay (International Airport) are on-going and it is believed that the installation of all the three Doppler

weather radars equipment would be completed by next year 2017. The location map of (30) AWS stations and (3) radars are shown in below.



**Location map of the (3) weather radars system and (30) AWS Stations**

#### **4.0 CALIBRATION EQUIPMENT**

Most of the calibration equipment in the workshop are obsolete and need replacement. For accuracy of measurements, any instrument purchased should be calibrated so as to confirm its status before it is sent for field installation. In an effort to conform to the established standards of the World Meteorological Organization (WMO), the Department of Meteorology and Hydrology, Myanmar still need to procure calibration equipment for Rain gauges, Thermometer, Temperature/Humidity Sensors while the supply of Pressure chamber, Temperature test Cabinet and wind Tunnel is to be made this year.

## **5.0 CONCLUSION**

Introduction of surface weather observing AWOS in our local observation stations, a quantitative and a qualitative improvement of the measurement of meteorological parameters in the country is ensured. The implementation of weather radar in Myanmar will improve forecasting accuracies and reduce costs on a long term because measurements are automated, data are more reliable, and they are available in real time.