C A R I B B E A N
M E T E O R O L O G I C A L
O R G A N I Z A T I O N

REPORT OF THE

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES

St. James, BARBADOS

16 NOVEMBER 2013

INTRODUCTION

1.1 At the kind invitation of the Government of Barbados, the 2013 Meeting of Directors of Meteorological Services was held at the Caribbean Institute for Meteorology and Hydrology, St. James, Barbados on Saturday 16 November 2013 under the Chairmanship of Mr Tyrone Sutherland, Coordinating Director of the Caribbean Meteorological Organization (CMO).

1.2 The Meeting fixed its hours of work and determined the order in which it would conduct its business.

1.3 A list of participants and observers attending the Meeting is attached as **ANNEX I** and the Agenda adopted by the Meeting is attached as **ANNEX II** to this Report.

STATUS OF ACTIONS FROM THE PREVIOUS MEETING
(Agenda Item 2)

2.1 The CMO Headquarters produced a single document containing an ***Action Sheet*** that allowed the Meeting to follow-up on the actions taken to implement the decisions of its previous meeting, and to discuss any further actions if required.

2.2 In this regard, a summary of the decisions of DMS2012 (Saint Lucia, 2012) was prepared by the CMO Headquarters. The Science and Technology Officer gave the status of actions taken to implement the decisions to the Meeting.

TRAINING
(Agenda Item 3)

3.1 The Acting Chief Meteorologist of the Caribbean Institute for Meteorology and Hydrology (CIMH), Ms Kathy-Ann Caesar, gave a presentation on "*Competency Requirements for Aeronautical Meteorological Personnel, the CIMH Response*." Ms Caesar indicated that the services provided by meteorologists for aeronautical purposes were to save lives and property. Competency standards for Aeronautical Meteorological Personnel are a part of the quality management, which entails:

- the implementation of processes which improve quality overtime:
- that high quality data and products are provided by aeronautical meteorological services;
- coordination of activities to direct and control and organization in regard to ISO 9001:2008.

3.2 Section 2.1.5 of the ICAO Annex 3 publication, states;

Each Contracting State shall ensure that the designated MET authority complies with the requirements of the WMO in respect of qualifications and training of MET personnel providing services for international air navigation.

3.3 WMO No. 49 Vol. 1 - *Technical Regulations* – describes the WMO AMP Competency Standards and WMO No. 1083 - *Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology* provides further guidance. WMO No. 1083 identifies two broad categories of meteorological personnel, which are:

- *Meteorologist*: a person who has successfully completed the Basic Instruction Package for Meteorologists (BIP-M) requirements at university-degree level;
- *Meteorological Technician*: a person who has successfully completed the Basic Instruction Package for Meteorological Technicians (BIP-MT) requirements.

3.4 CIMH's response to the change in the categories of meteorological personnel was to rename the Senior-Level Meteorological Technician's (SLMT) course and to amalgamate the Entry-Level and Mid-Level Technicians' courses. It was explained that the SLMT would be now called the Aeronautical Meteorological Forecasters (AMF) course. However, the Meeting indicated that the new name of the SLMT created the impression that personnel who would receive the training can only provide forecasts for aeronautical services, which would not be the case. The Meeting recommended that CIMH review its decision on the name of the course.

3.5 Ms. Caesar indicated that under the new SLMT course grading scheme, the core components of the course would be equally weighted and failure to pass any of the core complements would result in the students receiving a Conditional Pass. This would mean that the student would have to resit an exam for the course failed within three months. If that exam is also failed, the student will have to resit the exam within one year; a failure after this exam would mean failure of the entire course. If the student still wishes to become an AMF, the entire course will have to be retaken.

3.6 The Meeting was informed that top-level competencies for an Aeronautical Meteorological Forecaster were developed and the AMF:l

A. For the area and airspace of responsibility;

B. In consideration of the impact of meteorological phenomena and parameters on aviation operations, and

C. In compliance with aviation user requirements, international regulations, local procedures and priorities,

Taking into account conditions A to C, having successfully completed the BIP-M an AMF should be able to;

1. Analyze and monitor continuously the weather situation;
2. Forecast aeronautical meteorological phenomena and parameters ;
3. Warn of hazardous phenomena;
4. Ensure the quality of meteorological information and services; and
5. Communicate meteorological information to internal and external users.

The Aeronautical Meteorological Observer, for the same A, B and C as above shall;

1. Monitor continuously the weather situation;
2. Observe and record aeronautical meteorological phenomena and parameters;
3. Ensure the quality of the performance of systems and of meteorological information; and
4. Communicate meteorological information to internal and external users.

3.7 The WMO Commission for Aeronautical Meteorology (CAeM) and the Expert Team on Education, Training and Competencies (ET/ETC) developed second level competencies, which:

- For each first-level competency, gives a;
    - Competency description, and
    - Performance criteria;
- Allows for regional variations (e.g. range of weather phenomena, regional regulations and communications technology).
- Identifies background knowledge and skills (e.g. meteorology, standards and procedures, and user requirements.

3.8 The third level competencies were to be created by National Meteorological and Hydrological Services (NMHSs) by adapting the second-level competencies to national circumstances and requirements. These are the third level (national) competencies would be the basis of the competency assessment by NMHSs.

3.9 The goal of the competency assessment was to show that the AMFs were competent, not necessarily perfect and if any deficiencies were identified by the assessment, processes must be in place to show improvement. To assist NMHSs in completing competency assessments, a toolkit was developed by the CAeM Expert Team on the Competency Assessment Toolkit (ET-CAT) which contained guidance on:

- Experiential questions;
- Test questions;
- Direct observation;
- Classroom or paper simulation;
- Case study.

The toolkit can be found at **http://forum.14.caem.wmo.int/post14web/tt_cat/.**

3.10 The **Director** of Trinidad and Tobago Meteorological Services (TTMS) indicated a preference to have the acceptable BSc. degrees, which along with BIP-M training could certify someone as being a WMO meteorologist and could be included in WMO No. 1083. Further, in regards to the competency assessment, the Director questioned as to whether the assessors of competency would be new duties for specific meteorological personnel or a new position, which had to be created within a meteorological service.

3.11 The Meeting was informed of the difficulty students have to pass the mathematics and physics courses. This difficulty was not confined to students in the English-speaking, Caribbean, but it was recognized as a worldwide phenomenon. It was recommended that a first level screening of potential students, who were to be sent to the CIMH, should be completed by the NMHS. The **Permanent Secretary**, Ministry of Agriculture in Guyana, suggested that CIMH could create online entry-level testing to ensure that potential students met the entry requirements. If they did not, remedial training in mathematics may be possible.

THE CMO RADAR NETWORK
(Agenda Item 4)

4.1 The Meeting was reminded of the telecommunication problems which prevented the creation of the radar mosaic by Météo-France during 2012. The Meeting was informed that Mr Sabu Best of the Barbados Meteorological Service (BMS) greatly assisted the Caribbean Meteorological Organization (CMO) and the United States National Weather Service, to fix the problem. This allowed Météo-France to create a radar mosaic with data from French Guiana, Barbados, Martinique, Guadeloupe, Cayman Islands and Belize. A radar mosaic which was created at 1230UTC on 15 November, showed no data from Guyana and Belize.

4.2 The Meeting was informed that the radars in Barbados, Belize, the Cayman Islands, Guyana, Jamaica and Trinidad and Tobago were functional. The **Head of the Weather Branch**, Jamaica Meteorological Service indicated that the radar in Jamaica has been functional since May 2013. The **Chief Meteorologist** of the Belize National Meteorological Service inquired as to when the radar data from Trinidad and Tobago would be included into the radar mosaic. The **Director**, TTMS replied that an officer was working diligently to have the data included in the mosaic.

4.3 The **Director** of the Antigua and Barbuda Meteorological Service (ABMS) spoke about the intermittent radar outages from the Météo-France radar in Guadeloupe, which have occurred at crucial times leaving Antigua and Barbuda Meteorological Service unable to effectively provide early warning to its citizens. The **Head of Meteorology** of the Grenada Meteorological Service indicated that the present 150 km range provided by Trinidad and Tobago in their radar scans does not provide adequate coverage for Grenada to monitor or forecast the behavior of the Intertropical Convergence Zone (ITCZ).

4.4 The Head of the Weather Branch, Meteorological Service of Jamaica inquired about expanding the radar mosaic. The **Chairman** indicated that within the WMO Integrated Observing System (WIGOS) for RA IV, there was a project to share radar data imagery for mosaic creation. However, the project would be informed by the success of the CMO Radar Network.

4.5 **The Chairman** of the Meeting, inquired of the Chairman of the East Caribbean Civil Aviation Technical Group (ECAR/CATG), as to what are the requirements needed by air traffic management from the radars. The Chairman of the ECAR/CATG indicated that in the past, air traffic control in Barbados had superimposed satellite imagery on the ATC radar display. However, this practice has been discontinued. The Meeting was informed that the Barbados Meteorological Service (BMS) provides an excellent service to air traffic control. The Chairman inquired as to whether a monitor located in the air traffic control tower to display weather radar imagery would be of benefit. However, before this could materialize, discussion would have to ensue between the BMS and the Civil Aviation Department (CAD)

4.6 The **Director**, TTMS, indicated that during their stakeholders meetings for the implementation of a quality management system, interest was expressed by stakeholders to have access to radar imagery. The TTMS created a special website for stakeholders only to provide the products for which they have expressed an interest. The **Head of Meteorology**, Grenada Meteorological Service indicated that Meteorological Services should be guided by ICAO document *9377-Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services*.

4.7 The **Chief Meteorologist**, Belize National Weather Service, indicated that SELEX was contacted to ascertain the cost of training for meteorological technicians in Belize. The quotation provided was higher than expected and the Chief Meteorologist sought a cost sharing mechanism with the other radar host countries in order to train as many technicians as possible. This would be explored by the radar host countries during 2014.

4.8 The Chief Meteorologist, Belize National Weather Service, indicated that there had been intermittent functionality of the radar due to an inoperative dehumidifier. However, this should be rectified shortly. Further, the Meeting was informed that cracks which appeared in the wall of the radar room during 2012 seemed to have grown wider. An inspection by the engineer of the Ministry of Works was completed and the report would be soon submitted. The meeting was also informed that the radome has been leaking and water seeped through the concrete under the antenna into the radar room. It was noted that the leaks occurred after the radome had been cleaned with a non-compliant substance. It was recommended to the Chief Meteorologist that the manual on the radome maintenance be consulted for remedial measures.

4.8 The **Director-General**, Cayman Islands National Weather Service (CINWS) expressed his thanks to the CMO for services rendered to have installed a state-of the-art dual polarized Doppler radar in Grand Cayman.

OPERATIONAL MATTERS

(Agenda Item 5)

5.1 The Meeting was made aware of a number of matters which were particularly related to the operations and the services delivered by Meteorological Services in the Caribbean.

(a) WMO Annual Global Monitoring

5.2 The Meeting noted that most Meteorological Services of the Member States that have stations in the Regional Basic Synoptic Network (RBSN) did not participate in the World Meteorological Organization (WMO) Annual Global Monitoring (AGM), which monitors the data disseminated over the Global Telecommunication Service (GTS). A perusal of the 2013 monitoring folder on WMO's ftp server after 15 November, where digital results were posted, indicated that only Dominica and Trinidad and Tobago had posted results at that time.

5.2 The Meeting was also presented with the results of the 2012 AGM, which showed that with the exception of the stations in the Cayman Islands, Dominica, Guyana, Saint Lucia (1) and Tobago, the other RBSN stations synoptic observations were received in excess of 90% of the expected observations, during the monitoring period of 1-15 October. The observations from stations in the Cayman Islands, Dominica, Saint Lucia (1) and Tobago were received between 45% to 90% of the expected observations, while most of the stations in Guyana were silent.

5.3 Trinidad was the only station to report more than 90% of the TEMP (Upper air) observations. Barbados, Cayman Islands, and Jamaica were silent and only 45 to 90% of Belize's TEMP observations were received. Several of the NMHSs made the point that these results could be misleading since their own monitoring showed that their observations had indeed been transmitted and received. However, it was pointed out that the very idea of participating in the AGM was to identify any transmission/reception issues along the GTS. Nonetheless, it was suggested that self monitoring should be done only through a designated Regional Telecommunication Hub (RTH), World Meteorological Centre (WMC) and ICAO/OPMET data bank.

(b) Competency Standards for Aeronautical Forecasters and Observers

5.4 The Meeting was informed that deadline for implementation of Aeronautical Meteorological Personnel (AMP) Competency Standards was 1 December 2013 and Meteorological Services that were having difficulty to have personnel assessed and found competent should consider mitigation options. Meteorological Services must also ensure that the assessors who are to be used in the assessment must also be competent.

5.5 A clear plan was necessary having the following basic structure:

1. Establish a prioritized list of personnel that required assessment;
2. Assemble a team of assessors;
3. Develop an initial assessment methodology based on desk-top evaluations of quizzes, portfolios and existing evaluations including verification of products;
4. Develop a prioritized plan for individual, in-depth assessments of personnel based on the results of the desk-top evaluations;
5. Estimate the time and resources needed for the completion of these steps;

5.6 The Meeting suggested that NMHSs seek cooperation arrangements with other Services, in particular where numbers of staff and resources are very limited. The WMO and the Commission for Aeronautical Meteorology developed a seven step process toward conformance, which is provided in **ANNEX III.**

(c) Lightning Detection Systems

5.7 The Meeting was informed that a lightning detector was a device that detects lightning produced by thunderstorms. There are three primary types of detectors: *ground-based* systems using multiple antennas, *mobile systems* using a direction and a sense antenna in the same location (often aboard an aircraft), and *space-based systems*.

5.8 Each system used for lightning detection has its own limitations. These include:

- A ground-based lightning network must be able to detect a strike with at least three antennas to locate it with an acceptable margin of error. This often leads to the rejection of cloud-to-cloud lightning, as one antenna might detect the position of the strike on the starting cloud and the other antenna the receiving one. As a result, ground-based networks have a tendency to underestimate the number of strikes, especially at the beginning of storms where cloud-to-cloud lightning was prevalent.
- Since they use attenuation rather than triangulation, mobile detectors sometimes mistakenly indicate a weak lightning strike nearby as a strong one further away, or vice-versa.
- Space-based lightning networks suffer from neither of these limitations, but the information provided by them was often several minutes old by the time it was widely available, making it of limited use for real-time applications such as air navigation.

5.9 The Vaisala Global Lightning Dataset 360 (GLD360) which was introduced to the 2012 Meeting of Directors of Meteorological Services (Saint Lucia, 14 November 2012) and to which Forecast Offices have access, is a worldwide sensor network. The network sensors operate in the Very Low Frequency (VLF) band and approximately 70% cloud to ground flash detection with a median stroke location accuracy of 2 to 5 km. The Meeting discussed an operational trial of Vaisala's GLD360 that had been arranged by the CMO Headquarters. The consensus was that the system produces very good results at the synoptic scale and was an excellent operational tool. It was also recognized that consideration would need to be given to a set of detectors in the region that would increase the short-range accuracy necessary to produce warnings for infrastructure.

OUTCOME/HIGHLIGHTS OF SIXTEENTH SESSION OF RA IV AND SIXTH-FIFTH SESSION OF EXECUTIVE COUNCIL
(Agenda Item 6)

6.1 The Meeting was made aware of a number of matters which were discussed at the sixteenth session of Regional Association IV (North America, Central America and the Caribbean), held in Willemstad, Curaçao 12 to 19 April 2013 and the sixty-fifth session of the Executive Council of the World Meteorological Organization, held in Geneva, Switzerland from 25 June to 3 July 2013.

A The Sixteenth Session of RA IV

WMO Integrated Global Observing System (WIGOS)

6.2 The Meeting was informed that the Association expressed great appreciation that, in response to the request from the Sixteenth Congress, the development of a Regional WIGOS Implementation Plan for RA IV (R-WIP-IV) was initiated at the joint meeting of the RA III Working Group on Infrastructure and Technological Development and RA IV Task Team on Regional WIGOS Implementation (TT/RWI) (San José, Costa Rica, 26-30 November 2012). The Association expressed its appreciation to TT/RWI for the development of R-WIP-IV.

WMO Information System (WIS)

6.3 The Director's Meeting noted the WMO Information System (WIS) became operational in January 2012 with the launch of the first GISCs in RA II and VI. The *Manual on WIS* was released at the same time. With the increasing number of operational centres across the Regions and the interim metadata management service being provided by GISCs Beijing and Tokyo, WIS would be able to provide new and more flexible functionality to support all NMHSs core activities. The Manual on WIS defines the main components and functions of WIS and the designation procedures for centres to participate in WIS. It can be downloaded from **http://library.wmo.int/opac/index.php?lvl=notice_display&id=9254.**

6.4 The progress of WIS implementation in RA IV was reviewed and it was noted that 48 WIS centres have been identified, consisting of 35 National Centres (NCs), 12 Data Collection or Production Centres (DCPCs) and one Global Information System Centre (GISC). GISC Washington was the only GISC located in RA IV and that it is the principal GISC for 43 WIS centres.

Migration to Table Driven Code Forms

6.5 It was noted by the Association that Table Driven Code Forms (TDCF) are more flexible than the Traditional Alphanumeric Code Forms (TAC), allowing new types of observation or observing standard to be introduced rapidly, and overcoming other limitations of the TAC, most notably the shortage of station identifiers in some countries. The WMO Commission for Basic Systems (CBS) has confirmed that routine international exchange of information on the GTS should stop in November 2014 for all but OPMET data.

6.6 The Meeting was reminded that the Association had urged all Members that had not already done so to plan how they will operate when TAC are no longer exchanged as routine, considering not only the telecommunications aspects, but also the implications for observing, forecasting, display systems and user products.

B Sixty-Fifth Meeting of the Executive Council

Aeronautical Meteorology – Emerging Challenges

6.7 The Meeting discussed the outcomes of the 2013 WMO Executive Council session. It noted that the Council recalled that aeronautical meteorology was a priority for WMO because for many NMHSs, the aviation sector was a crucial client on which the viability of many NMHSs depended. In the view of WMO's partner organization, the *International Civil Aviation Organization* (ICAO), the future development of aviation would be building on the pillars of safety and quality management, the use of advanced technologies for operations and Air Traffic Management, regionalization of services to aviation, and establishment of high standards of infrastructure, personnel competence and efficiency. For Members and their meteorological service providers to civil aviation, these challenges would require a significant increase in their efforts that would be made possible by a much increased regional and global level of cooperation.

6.8 The Council was reminded that there are many challenges for NMHSs in providing services to aviation which are reflected in the five top level priorities of the Commission for Aeronautical Meteorology which are:

(a) Implementing and sustaining QMS noting that a number of Members appear to have missed the ICAO implementation deadline of 15 November 2012;

(b) Undertaking assessment and documentation of the competency of Aeronautical Meteorological Personnel (AMP) noting the WMO deadline of 1 December 2013;

(c) Improving the efficiency and effectiveness of SIGMET issuance;

(d) Improving services to aviation, in particular for air traffic management in high-density airspace, but also for average density areas;

(e) Improving Members' ability to respond to volcanic ash and other large-scale, high-impact events, e.g. space weather, tropical cyclones and nuclear incidents

6.9 The Meeting was told that the Executive Council recognized that, following the expiry of the deadline on 15 November 2012, ICAO provisions concerning the quality management of meteorological services for international air navigation were now upgraded from a Recommended Practice to a Standard. The Council was, however, informed of an agreement in principle between the relevant WMO and ICAO Secretariats that Members not complying with the Recommended Practice of obtaining certification in accordance with the ISO 9001 Standard, should, as a minimum, provide evidence for having achieved the following milestones:

(a) Evidence of a contractual arrangement between the Meteorological Authority and Service Provider with clearly established responsibilities;

(b) Availability of quality policy, quality manual and complete set of work instructions/ process descriptions at all workplaces, and familiarity of staff with these documents;

(c) Documented evidence of user consultation and feedback (publications, questionnaires, records of user meetings, actions stemming from these);

(d) Evidence of corrective and preventive action processes; and

(e) An internal audit plan, audit reports and documented follow-up decided by a Management Review meeting.

SIGMET Advisory Trial

6.10 The Directors Meeting was informed that the Council noted with concern that, although RA IV was not part of this exercise, some Members in the Region struggled to comply with the relevant ICAO regulations, due to a severe lack of personnel and financial resources made available to them. The Council noted with concern that some aviation stakeholders and authorities were exerting strong pressure on ICAO to transition to a more phenomena-based, regionalized provision of SIGMET advisories, which would possibly affect the role and resourcing of some of the smaller Members in the Region.

6.11 In the case of severe resource deficiencies, the Council further encouraged those Members concerned to seek the temporary transfer of their SIGMET responsibilities through negotiations involving ICAO, to a Member in a position to provide this service on their behalf until such time that the necessary capabilities have been re-established, and noted Resolution 6 (EC-64) – Alternate means of compliance with ICAO SIGMET Provisions.

Public Weather Services

Implementation Plan for the WMO Strategy for Service Delivery

6.12 The Council recalled that, as requested by the Sixteenth World Meteorological Congress, the Secretary-General had arranged for the preparation of a draft Implementation Plan (IP) for “The WMO Strategy for Service Delivery” for approval by the Executive Council. The Council fully supported the mainstreaming of a Quality Management System (QMS) in NMHSs through the implementation of the Strategy. The Implementation Plan was strongly supported and its publication was welcomed in view of the desirability of NMHSs to improve their service delivery, and recognized that these improvements would promote increased credibility and visibility of NMHSs in the eyes of the governments and user communities

6.13 The Council urged Members to adapt and apply the Strategy and its IP to their own service delivery strategies and plans, for the delivery of quality services to all social and economic sectors in support of security of life, livelihood, property and national economic activities. The Council highlighted instances where weather phenomena, which had been well

forecast, nevertheless led to considerable loss of life and damage. It urged that best practices in service delivery and strongly encouraged the engagement of Members in adopting the Common Alerting Protocol (CAP) standard for communicating alerts. It recognized that the concept of CAP was not yet widely understood and that NMHSs needed assistance, through initiatives such as the CAP Jump-Start workshops, in becoming familiar with this technology and its utility.

THE IMPACTS OF WEATHER DURING 2012

(Agenda Item 7)

7.1 The Directors of Meteorological Services provided the impacts of weather on their countries during 2013.

7.2 The islands of **Barbados**, **Dominica**, and **Saint Lucia** were placed under tropical storm warning on 0300UTC on 8 July as **Tropical Storm Chantal** neared the northern Windward Islands, **St. Vincent** was placed under tropical storm watch at the same time. The watch for St. Vincent was discontinued at 1800UTC on 8 July and the warning for Barbados was discontinued at 1500UTC on 9 July, at 1800UTC, the warning for Saint Lucia was discontinued and at 2100UTC for Dominica. Rainfall was minimal, although gusts in excess of tropical storm strength were measured in Barbados, Dominica and Saint Lucia.

7.3 On 2 September, a massive **landslide** occurred along the main road in the interior village of Belmont in **St. Vincent**. The landslide was more than sixty feet in width and over one hundred and fifty feet in depth and resulted in the closure of the main road which leads into the Mesopotamia Valley. **Dominica** received extensive heavy rainfall during the period17-20 April with Melville Hall recording 437.77mm for the period. This caused **flooding** and **landslides** and it resulted in **two deaths** when a car dropped into a 40 feet crater caused by road subsidence. **St. Vincent** also had a **death**, which was attributed to a **lightning strike** on 14 September.

7.4 October was a wet month for **St. Vincent** with 435.5mm measured. On 5 October, more than 75mm of rainfall was measured within two hours which caused **flooding** and this led to the closure of the E. T. Joshua Airport until 1000UTC on 6 October. In **Barbados** a **wind surge** with wind speeds measured between 20 to 30kt on 25 October and there was a gust which reached 52kt. There was also torrential rain and thunderstorms which produced flash-flooding across the island. **Hail** was reported in **Jamaica** and **Guyana**. **Drought/dry spell** was reported in northern parts of **Saint Lucia** and **Grenada**.

OTHER MATTERS
(Agenda Item 8)

A. SHOCS PHASE II

8.1 **Dr. Martti Heikinheimo** of the Finnish Meteorological Institute (FMI) gave a presentation on the overarching purpose of the second phase of the Project "*Strengthening Hydrometeorological Operations and Services in the SIDS Caribbean (SHOCS)",* which was to strengthen the role and enhance the capacity of National Meteorological and Hydrological Services and Disaster Management Agencies in the sixteen selected SIDS to help mitigate impacts of natural hazards. For this phase the expected results are:

1. To improve operation capacity of NMHSs to provide weather and climate services;
2. To enhance the role and improve the capacity of NMHSs and Disaster Management Agencies for the governance of the early warning process.

8.2 To achieve these expected results the following activities would be pursued;

1. Training and consulting on rehabilitation of Automatic Weather Stations (AWS) and data distribution: - It was intended to provide support and training on the maintenance, restoration and quality assurance and quality control. This should increase the regional access to data and allow more data to be transmitted via the Global Telecommunication System.
2. Implementation of forecasting tools and production systems at selected NMHSs: - The installation of eight SmartMet systems, which was developed by the Finnish Meteorological Institute, at selected offices, to collate, view, analyze and interpret meteorological data within one production environment. Training would be provided for technicians and duty meteorologists.
3. To enhance the communication of climate information to the Caribbean Communities; - This phase will support the CIMH in its role as a Regional Climate Centre Further a service portal will be created for climate information
4. Build Capacity in institutional governance through Quality Management: - Training for QMS internal auditors and to have consultation on the completion of the QMS process.
5. Solutions for common presentation and communication of early warnings : - It is intended to harmonize the symbols, colors and risk levels for hydrometeorological hazards across the selected states and to develop an interface to manage and issue watches and warnings and related information different format including Common Alerting Protocol (CAP).
6. To enhance presentation skills through the use of presentation hardware and software.

B. TROPICAL CYCLONE FORECASTER COMPETENCIES

8.3 **Mr Keithley Meade** gave a presentation on the standards and competencies for providing a forecast on tropical cyclones in RA IV. The competencies which were being developed are adapted from the approach taken by the Australian Bureau of Meteorology and RA V competencies.

8.4 The competencies, which were presented as required to be a tropical cyclone forecaster in RA IV, were as follows:

- General weather forecasting and forecast preparation skills.
- General synoptic analysis techniques (including data limitations).
- Ability to analyse and synthesize a range of data types.
- Numerical Weather Prediction (NWP) – interpretation of model strengths and limitations; and model comparisons.

8.5 Recognizing that there were differences in resources (both human and physical) between Member States in RA IV, a framework was developed which takes care of the variations in activities and services for tropical cyclone forecasters. Activities of tropical cyclone forecasters were divided into three categories, which were;

1. Providing guidance for other Services to downscale (RSMC Miami);
2. Downscaling RSMC guidance to tailor forecasts. (The role of most of the forecast offices in RA IV)
3. Work with the forecasts provided by Services that downscaled the guidance.(Primarily non-forecast offices)

8.6 After all other matters were discussed, the Meeting ended about 6:00PM.

CARIBBEAN METEOROLOGICAL ORGANIZATION

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES **Doc.1(a)**

St. James, Barbados - 16 NOVEMBER 2013

AGENDA

1. INTRODUCTION AND ADOPTION OF AGENDA
2. STATUS OF ACTIONS FROM THE PREVIOUS MEETING
3. TRAINING
4. THE CMO RADAR NETWORK
5. OPERATIONAL MATTERS
   - (a) WMO Annual Global Monitoring
   - (b) Competency Standards for Aeronautical Forecasters and Observers
   - (c) Lightning Detection Systems
6. OUTCOME/HIGHLIGHTS OF
   - (a) The Sixteenth Session of RA IV
   - (b) 2013 WMO Executive Council
7. THE IMPACTS OF WEATHER DURING 2013
8. OTHER MATTERS

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ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES
CHRIST CHURCH, BARBADOS
16TH NOVEMBER 2013

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Competencies

Seven steps towards conformance

Clarification: Competencies vs Qualifications

Qualifications and competencies are different. In many countries, qualifications acquired in formal education and training link to staff categories and remuneration scales. Competency simply means the ability to do the job to the required/defined performance level. The required competencies are closely related to job descriptions and assigned duties for operational positions.

By 1 December 2013, all aeronautical meteorological air navigation service providers, including those from the private sector, must be able to demonstrate that their Aeronautical Meteorological Forecasters (AMF) and Aeronautical Meteorological Observers (AMO), for their designated area and airspace of responsibility, can do the job to a performance level that can be mapped through to the top level Aeronautical Meteorological Personnel (AMP) competency Standards.

ICAO will be looking for:

1. The local adaptation of the top level AMP competencies specified by WMO and how these map through to the top level competency Standards;
2. Detailed lists of which AMF and AMO are assigned to which tasks, and for AMF, what their underpinning meteorological qualifications are, and records of when and where they were last assessed for competency and by what methods;
3. What remedial actions are being taken to remedy any deficiencies identified;
4. Sound reasoning for the competency assessment methods chosen.

The WMO Commission for Aeronautical Meteorology, in close cooperation with the AEM Division and the ETR Department, is recommending the following **seven steps** as best practice to achieve conformance:

1) Access the top level WMO competency Standard statements;
2) Designate a team and leader to lead the competency assessment processes;
3) Map the top level Competency Standards to the national requirements and have them agreed by the Meteorological Authority of the country;
4) Develop and document the assessment process;
5) Trial the assessment process;
6) Undertake the assessment process and document the results;
7) Review and document the process.

Step 1

- Access the regulatory material as decided by Cg-XVI on aeronautical meteorological personnel competency standards from:

  http://library.wmo.int/opac/index.php?lvl=etagere_see&id=39, or
  http://www.caem.wmo.int/moodle
  (Click on Regulatory and Reference Material and then click "login as guest").

Step 2

- Designate a person or small team to develop and run the aeronautical meteorological personnel competency assessment programme;
- This person (or team) is then responsible for the implementation actions but the Director / CEO is accountable for ensuring that it is carried out.

Step 3

- Map the top level Competency Standards to the national requirements and have them agreed by the Meteorological Authority of the country. These needs will depend on the typical climatology and weather hazards and should be defined in consultation with users.

Step 4

- Review and develop options for undertaking and documenting the competency assessment processes – seek an independent review as per the best practice 'twinning' concept. Note that a mix of approaches may be used, but their choice should be reasoned, documented and stable;
- Create teams of assessors building primarily on individuals that have participated in WMO assessment training workshops;
- Establish a prioritized list of personnel that requires assessment; (e.g. ensure that shift leaders/supervisors have first priority);
- Develop, as a first step, an initial assessment methodology based on desk-top evaluations of quizzes, portfolios and existing evaluations including individualized verification of products for all relevant personnel;
- Develop a prioritized plan for individual, in-depth assessments of personnel based on the results of the desk-top evaluations;
- Develop an estimate of the time and resources needed for the completion of these steps;
- Inform the Quality Management Team of the NMHS and the WMO Secretariat of this estimate;
- Determine a realistic frequency of the assessments (e.g. major assessments every three years with annual "spot checks").

Step 5

- Trial assessment process to check details on a limited number of staff;
- Collect and analyse outcomes to build up a national training needs data base;
- Establish a realistic assessment plan and estimate of when first round of assessments can be completed;
- Inform the Quality Management Team of the NMHS and the WMO Secretariat of this estimate;
- Where national resources are scarce, seek cooperation arrangements with other Members of the region.

Step 6

- Carry out assessment plan, document and analyse results as a basis for identifying and taking any remedial actions as required

Step 7

- Undertake a management review of the documentation and processes to determine lessons learnt;
- Apply the lessons learnt;
- Start the process again building on the lessons learnt.

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