



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

Kingston, JAMAICA

22 NOVEMBER 2014

INTRODUCTION

1.1 At the kind invitation of the Government of Jamaica, the 2014 Meeting of Directors of Meteorological Services was held at the Jamaican Pegasus Hotel, Kingston, Jamaica on Saturday 22 November 2014 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 DMS2013 (Barbados, 2013) 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 delivery of quality training programmes in the areas of meteorology, hydrology climatology and instrument management (maintenance and calibration) continued to be of critical importance to the Caribbean Institute for Meteorology and Hydrology (CIMH) despite the significant progress made in other areas of the CIMH's activities. The training programmes continued to be viewed by the World Meteorological Organization (WMO) as extremely innovative in the use of online technology and responsiveness to the needs of stakeholders and changing polices and trends.

3.2 During 2014 the following courses were completed:

- The third class of students enrolled in the Aeronautical Continued Professional Development (AeroCPD) programme graduated. The class consisted of fourteen (14) students from seven (7) Member States.
- An Entry-level Meteorological Technician course which was completed in July 2014 with ten (10) students completing the programme.
- An Operational Forecasters Course was completed in 2014 with three (3) persons completing the course.
- Ten (10) students graduated from the University of the West Indies B.Sc. programme in Meteorology. The top student of the BSc Meteorology programme was **Mr Shem Willie** of Saint Lucia with a grade point average (GPA) of 4.04.
- Seven (7) students graduated from the Hydrological Technicians course.

- The Instruments Section ran two training courses targeted to individuals charged with the maintenance and management of observation equipment; in particular, automatic weather stations. The first was an unfunded one week course entitled “*Instrument Maintenance – Calibration & Laboratory Practices for Meteorologists*”. The course was designed to provide basic and practical knowledge for Meteorological technicians in the area of calibration of sensors. The second course was funded by WMO and targeted persons responsible for the maintenance and calibration of instruments at the national level. Eight (8) students from Member States attended the four (4) week training course.

3.3 The following courses were started during 2014:

- A second Entry-Level Meteorological Technicians Course (ELMT) commenced in October in response to a special request for ELMT training from the Government of Trinidad and Tobago which needed to have nine (9) students trained. Saint Lucia also indicated that it had funds to train one (1) student.
- Ten (10) students enrolled in the Senior-Level Meteorological Technicians Course (SLMT) course which started in January 2014 and it would be completed in July 2015.
- CIMH introduced a new online course “*Flood Hazard Mapping*”. At the request of WMO, the course was advertised to a global audience. Approximately sixty (60) persons from nineteen (19) countries enrolled. This number of students has been broken into two (2) classes and the first class commenced on 19 November, 2014. A monitoring and evaluation programme would have to be initiated in order to track the progress of the students after they have graduated from this course to ensure value for money.

3.4 The **Director**, Trinidad and Tobago Meteorological Service thanked the Principal of CIMH for acceding to his special request for the ELMT training which commenced in October 2014, despite the need to reschedule the course several times. The **Director-General**, Cayman Islands National Weather Service (CINWS) commended the CIMH for embarking on the AeroCPD course which has been a great benefit to the CINWS and he indicated that by the time the next course was finished, all of the Forecasters employed by the CINWS would have completed the course.

3.5 The **Department Head, Sint Maarten Meteorological Service** thanked the Principal for providing the personnel and the refresher training to the ELMT members of staff of his Service. **The Director, Antigua and Barbuda Meteorological Service** also commended the Institute on the AeroCPD course and sought to ascertain whether the course would be discontinued in the future. The Principal indicated that the course would not be discontinued but it may be offered every two years rather than every year in the future, however, the changing of when the course would be offered would take into account the need for Services to show that their aeronautical forecasters are competent.

3.6 The CIMH continued to take pride in the outputs and outcomes from the Internship programme. Graduates from the programme continue to achieve academic excellence in the undergraduate programme at UWI and in many cases, graduates of the programme are likely to further their education at the graduate level and, in several cases, use projects they worked on during their internships as their graduate research projects. The increasing number of graduate students in the Caribbean strengthens the regional research base and increases our knowledge of the environment. CIMH continues to monitor the progress of many of these students through the course of their graduate programmes.

3.7 The **Principal** advised the Meeting that when persons are sent to the CIMH as prospective students, the Directors should advise the Institute about any health challenges and health insurance coverage of the prospective students, since the health of the students directly impact on their ability to learn. It has proven difficult to obtain health insurance coverage for the students after they were attending courses for weeks before insurance coverage was sought.

3.8 The Principal indicated that CIMH required a clear understanding from the Meteorological Services as to their needs in operational activities and applied research, in order to position the Institute to supply training to satisfy the stated needs. The methodology to assist in the communication between the Meteorological Services and the CIMH would have to be defined during 2015.

Specialized Training

3.9 The Organization of the Eastern Caribbean States (OECS) has a five year project entitled Reduce Risks to Human & Natural Assets Resulting from Climate Change (RRACC). The project required the CIMH to provide agrometeorological training to agriculture extension officers and agriculturalists in the six (6) participating states. The course ran from 14 January to 4 April, 2014.

OPERATIONAL MATTERS

(Agenda Item 4)

4.1 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

4.2 The Meeting noted that some 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). There are ten (10) Member States of the Caribbean Meteorological Organization whose National Meteorological Service (NMS) are RBSN stations. These are Antigua and Barbuda, Barbados, Belize, the Cayman Islands, Dominica, Grenada, Guyana, Jamaica, Saint Lucia and Trinidad and Tobago. A perusal of the 2014 monitoring folder on WMO's ftp server after 15 November, where digital results were posted, indicated that only Barbados, Belize, the Cayman Islands, Dominica and Trinidad and Tobago had posted results at that time.

4.3 The Meeting was also presented with the results of the 2013 AGM from WMO's data archive at ftp://ftp.wmo.int/GTS_monitoring/AGM/To_WMO/201310/ which showed only Dominica and Trinidad and Tobago submitted results of their monitoring for the AGM. The results which were presented for the monitoring of SYNOP, TEMP and CLIMAT reflected for the most part, the reports from the RTH and MTN centres and the results showed that for the SYNOP code from the fourteen (14) offices reporting from the Member States, eight (8) were within the 90-100% range and the rest were in the 45-90% range.

4.4 The upper-air station in Kingston was deemed silent and upper-air reports from the Cayman Islands were in the 1-45% range. No CLIMAT reports from the Cayman Islands, Jamaica, Guyana and Trinidad and Tobago were received during the AGM period in 2013 and they were deemed to be silent.

(b) Migration away from Traditional Alphanumeric Code Forms

4.5 The Meeting recalled that migration away from Traditional Alphanumeric Code Forms to Table Driven Code Forms (TDCFs) had been discussed at several previous meetings of the Directors of Meteorological Service starting from 2008. The WMO migration plan called for the complete migration of the SYNOP, TEMP, PILOT and CLIMAT code forms (category 1 observations) to BUFR **by November 2010** after a period of dual code forms transmitted on the Global Telecommunication System (GTS), which started from November 2005. Member States of WMO were requested to name a national focal point and to develop their migration plan accordingly.

4.6 One of the reasons for the change to TDCFs was difficulty experienced by Meteorological Services under the traditional alphanumeric code form to assign station numbers because there were insufficient WMO station identifiers available to assign a unique number to each station in a country and that this was hindering the international exchange of information. Meteorological Services that do not make the change would not be able to access observations from observing stations that are allocated a station number from the extended range. They would experience a reduction in the number of observations available to them as changes to observing systems create information that cannot be represented in the Traditional Alphanumeric Codes (TACs). It must be noted that no Meteorological Service of CMO Member States had migrated to TDCF (MTDCF) and the migration to TDCF was scheduled to be completed in November 2014.

4.7 The Meeting was informed that although no Meteorological Service of CMO Member States would be ready by the cut-off date of November 2014, the Meteorological Services in the Cayman Islands, Guyana and Trinidad and Tobago had submitted a Request for Change form to the RTH in Washington which indicated that they would be transmitting synoptic observations in BUFR format from 5 January 2015. CMO has created a graphical user interface which is coupled to the BUFR software created by the European Centre for Medium range Weather Forecast (ECMWF), which was available to Meteorological Services upon request.

4.8 In order to facilitate the migration to BUFR code of all transmissions of Category 1 data sent to the RTH in Washington, with a deadline of November 2014, a workshop on the processing and transmission of weather and climate data in BUFR code, sponsored by the National Meteorological Service of Mexico, would take place from 1 to 5 December 2014 in Mexico City. A new web system for capturing synoptic observations, which was developed by the National Meteorological Institute (IMN) of Costa Rica, would be provided to the participants. The products from this system would be coded into BUFR using an encoding library (the Canadian library "libECBUFR" in this particular application), and then the resulting files would be transmitted to the RTH using a free software developed by the US NWS. In the first stage, this methodology was being shared with the Spanish speaking countries of RA IV, but all the tools and methodologies are freely available for the Anglophone Caribbean Members, if required.

4.9 Meteorological Services of Member States of the Caribbean Meteorological Organization operate five (5) Cooperative Hurricane Upper-Air Stations (CHUASs) in Barbados, Belize, the Cayman Islands, Jamaica and Trinidad and Tobago. The Maintenance Branch of the United States National Weather Service revealed to the CMO that, due to the limitations of the IMETOS software capability used in the CHUAS network, there are no plans to invest resources in upgrading the software package. There were plans for a complete overhaul of the CHUAS network during the United States of America 2015 fiscal year. The overhaul would include new 403 MHz radiosonde systems, which included antennas, computers, radiosondes and operating software, which would generate the BUFR code.

4.10 Migration of METAR, SPECI, SIGMET and TAF would be completed by November 2016. Testing of the transmission of the observations and forecasts via the Aeronautical Fixed Telecommunication Network (AFTN) occurred in 2009 and 2010 with some success. WMO has developed its Logical Data Model (LDM) in Unified Modeling Language (UML) for the aviation code forms, but the International Civil Aviation Organization (ICAO) would like the data in eXtensible Markup Language (XML).

4.11 The Meeting was advised that the registers which were used to record the observations would eventually have to be changed as new staff are introduced and trained, and as the Caribbean Institute for Meteorology and Hydrology ceased to teach the SYNOP, METAR and SPECI code forms.

(c) Quality Management Systems

4.12 The International Civil Aviation Organization (ICAO) first recommended that the Meteorological Authority be certified as ISO 9001 compliant in November 2001 and it was expected that this recommendation would become a standard in November 2010. However, by November 2013, the recommendation for ISO compliance was discontinued and the recommendation stated:

2.2.6 Recommendation — Demonstration of compliance of the quality system applied should be by audit. If non-conformity of the system is identified, action should be initiated to determine and correct the cause. All audit observations should be evidenced and properly documented

4.13 Further, the Sixty-fifth meeting of the WMO Executive Council (Geneva, 15-23 May 2013) was informed of an agreement in principle between the relevant WMO and ICAO Secretariats that Member States 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 routine use of these documents by staff;
- 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.

4.14 It was expected that in the future, when Contracting States of ICAO have implemented a quality management system for the provision of meteorological services to aviation, the ISO certification would be required. ISO 9001:2008 was under revision during 2014, which was a normal process since all standards were reviewed every five (5) years to establish if a revision was required to keep it current and relevant for the marketplace. A new standard ISO 9001:2015 would be published in September 2015 and all Meteorological Services which were certified under ISO 9001:2008 would have three years from the date of publication, to complete the new documentation and seek certification under the new standard.

4.15 The WMO Strategy for Service Delivery, which was available at http://www.wmo.int/pages/prog/amp/pwsp/documents/WMO-SSD-1129_en.pdf, refers to the QMS as a vital approach to all service areas and steps must be undertaken to promote QMS in the provision of services which have important safety implications, such as marine, hydrology, disaster risk reduction, etc. Quality management was becoming a requisite function and managerial practice to be promoted through different service delivery areas. The new ISO 9001:2015 Standard has some fundamental changes, including a focus on leadership and risk management, which would necessitate a retooling of the existing QMS processes and procedures with National Hydrometeorological Services.

4.16 The **Director, Trinidad and Tobago Meteorological Service** informed the Meeting that the Service had employed a Quality Manager for the QMS and the Service was linking their QMS with the necessary sections of the Occupational Health and Safety Act (OHSA) in Trinidad and Tobago to ensure that they are compliant. The Director further informed the Meeting that according to the Air Navigation Plan of Trinidad and Tobago, the Service was both the Meteorological Authority and Service provider which was posing a difficulty since the Service had to provide evidence that there was a contractual arrangement between the Meteorological Authority and the Service Provider with clearly established responsibilities. Other Services in the region were named as both the Meteorological Authority and Service Provider. The Meeting recommended that the Services which are both the Meteorological Authority and the Service Provider dialogue with the necessary organization within their country to have the matter resolved, since it was the State which designates to ICAO, a meteorological authority to provide meteorological service for international air navigation or to arrange for the provision on its behalf.

4.17 The **Airport Manager, John Osborne Airport, Montserrat** informed the Meeting that five states which are Members of the Organization of Eastern Caribbean States, were bounded by the Eastern Caribbean Civil Aviation Authority (ECCAA) Agreement Act, which transfers the responsibility of oversight of all aspects of civil aviation including meteorology from the Member State to the ECCAA. However, the **Director, Antigua and Barbuda Meteorological Service** was unsure on the veracity of the statement by the Airport Manager.

(d) Regional Telecommunication Issues

4.18 RA IV (North, Central America and the Caribbean) had included in its WMO Integrated Global Observing System (WIGOS) Implementation Plan, a Project to get observational data from Automatic Weather Stations (AWSs) onto the Global Telecommunication System. However, as indicated above, there were insufficient WMO station identifiers available to assign a unique number to each station in a country using the traditional alphanumeric code forms.

4.19 WMO requires that modifications to the index numbers of synoptic land stations or aeronautical meteorological stations on land, whose reports are included in international exchanges, should be made effective on 1 January or 1 July and they should be communicated to the Secretariat through the Permanent Representative of the Member State with WMO, at least six months prior to becoming effective.

4.20 The International Satellite Communication System (ISCS) was decommissioned at the end of June 2012 and its replacement is a two (2) part system. The first part is the *Global Telecommunications System (GTS) Internet File Service* (GIFS) which was provided by the United States National Weather Service (NWS) for WMO Regional Association IV (RA-IV) Member States, and other WMO Regions that are adjacent to RA-IV, as a highly reliable Internet source of meteorological products. The second portion was the *WAFS Internet File Services* (WIFS), which hosts WAFS products intended for flight planning and documentation, in accordance with ICAO Annex 3 - Meteorological Service for International Air Navigation.

4.21 Connectivity to the GIFS and WIFS was through a secure socket layer virtual private network (SSL-VPN), which used a username and password to authenticate the user. Furthermore, a Meteorological Service which do not have access to a meteorological workstation could transmit its observations through the NWS Email Data Input Service (EDIS), the File FTP service or bulletin input form, which all require prior establishment of an account with the NWS Telecommunication Operations Center (TOC)

4.22 The Meeting was informed that the method of transmitting observations to the GIFS server would change from SSL-VPN to FTP Secure (FTPS) by December. The change of the authentication method would be at no cost to the Meteorological Services using the system. However, with the impending transition of synoptic observations in BUFR, Meteorological Services which transmit its synoptic observations via EDIS would not be able to do so since EDIS was not equipped to transmit binary data. FTP accounts would have to be created by the TOC for Meteorological Services that used EDIS for the transmission of synoptic observations.

(e) CMO Radar Network

4.23 The Meeting was informed that the Barbados Meteorological Service, under its own initiative, has created a radar mosaic by developing BUFR software that decodes and displays the radar images. The mosaic was available online at http://www.barbadosweather.org/BMS_radar_Composite.php and the site offers four flavours of the mosaic, a full Atlantic, Eastern Caribbean and South America, Eastern Caribbean and Northwest Caribbean. The Director, Barbados Meteorological Services has given permission, to transmit the mosaic in portable network graphics format (PNG) to the GIFS server managed by the Telecommunication Operations Center of the United States National Weather Service under the WMO header QAEA00 TBPB for dissemination to users via EMWIN and Geonetcast-Americas broadcasts. The mosaic should be available to users of EMWIN and Geonetcast-Americas from 1 December 2014.

4.24 The **Deputy Chief Hydrometeorologist, Guyana Hydrometeorological Service** inquired about obtaining access to a list of spares stored at CIMH. The **Principal** indicated that the list of spares stored at CIMH can be made available to the radar host countries and the countries were reminded that those spares would be released on a use-and-replace program; otherwise the spares would be soon exhausted.

4.25 The **Director, Trinidad and Tobago Meteorological Service** provided the Meeting with an update on the functionality of the radar in Trinidad and explained the problems that they were experiencing with the supply of electricity to the radar building. It was indicated to the Meeting that the electricity supply to the radar site was characterized as “dirty” by engineers of the company that supplied the unlimited power supply (UPS) equipment and this has caused problems to the UPS, which cannot be alleviated by having spares on hand. Further the Meeting was informed that with the UPS being non-functional in Trinidad, the radar was operated with the generator providing electricity and this has caused the radar and the generator to undergo maintenance every two weeks. The **Deputy Chief Hydrometeorologist, Guyana Hydrometeorological Service**, reminded the Meeting that in the past the radar maintenance personnel used to communicate with each other and share their experiences in maintaining the radars and hence, build capacity and as such recommended that this practice be restarted.

4.26 The **Chief Meteorologist, National Meteorological Service of Belize**, reminded the Meeting that he had been advocating for some time that the radar host countries pool their resources to in order that radar training be provided to the staff on these countries in radar maintenance and radar interpretation at a reasonable cost. The Chief Meteorologist received a quotation for radar maintenance training from SELEX and has since sought funding from the NWS of the United States to provide the training. The National Meteorological Service of Belize had received radar interpretation training from SELEX funded by the NWS of the United States in the past. The **Coordinating Director**, indicated that preliminary discussions had been undertaken taken with the **Project Manager**, SHOCS II Project, for radar training be provided under this project. The **Deputy Chief Hydrometeorologist, Guyana Hydrometeorological Service**, indicated to the Meeting that radar maintenance training was provided to technical personnel of the Hydrometeorological Service on a two (2) year cycle by engineers from SELEX and that the Service had no objection to staff of other radar host countries being trained at the same time in Guyana, funded by the radar host country.

**OUTCOME/HIGHLIGHTS OF THE SIXTY-SIXTH SESSION WMO EXECUTIVE COUNCIL
AND THE ICAO/CAeM CONJOINT MET DIVISIONAL MEETING
(Agenda Item 5)**

5.1 The Meeting was made aware of a number of matters which were discussed at the Sixty-sixth Session of the Executive Council of the World Meteorological Organization (WMO), held in Geneva, Switzerland, from 8 to 27 June 2014 and the Conjoint Meeting between the Meteorology Divisional Meeting of the International Civil Aviation Organization (ICAO) and the Fifteenth Session of the World Meteorological Organization (WMO) Commission for Aeronautical Meteorology (CAeM-XV) held the in Montréal, between 7 and 18 July 2014.

A The Sixty-Sixth Session WMO Executive Council

Service Delivery

5.2 The Meeting was informed that the Council agreed that service delivery lies at the heart of the WMO mission and daily work. The Council shared the conviction that raising the standards of service delivery was vital for the success of Members as service providers and their goal of enhancing the visibility of National Meteorological and Hydrological Services (NMHSs) and attracting new resources to strengthen their capacity. It agreed that Members should be assisted to implement service delivery in a practical manner, recognizing sectoral requirements by users through training, developing guidance, and sharing best practices.

Aeronautical Meteorology

5.3 The Council recalled that the ICAO and WMO requirement for ISO 9000 certification was a recommended practice, thus not necessitating a formal notification of non-compliance as per Article 9(b) of the Convention. Nevertheless, it has been proven that the ISO certification was the best practice that ensures credibility and confidence with the aviation users. The Meeting was informed that in Region IV only about 20% of WMO Members had a certified quality management system and the lack of certification affects the credibility of the NMHSs and other aviation meteorology service providers and has a negative impact on their attempts to establish cost-recovery mechanisms.

Implementation of Competency Standards for Aeronautical Meteorological Personnel

5.4 The Meeting was informed that during the intersessional period, the provisions concerning the required competencies for aeronautical meteorological personnel (AMP), including aeronautical meteorological forecasters (AMF) and aeronautical meteorological observers (AMO), included in the *WMO Technical Regulations* (WMO-No. 49, Volume I, Chapter 5), became standard practices as of 1 December 2013. Therefore, all WMO Members were expected to undertake the necessary measures to ensure compliance with those standards and inform the Secretariat thereof. The Council also urged those Members who have not yet informed the Secretariat on the status of implementation to do so as soon as possible.

5.5 It was recalled that the qualification requirements for AMF in the *WMO Technical Regulations* would become a standard practice on 1 December 2016. The Council emphasized that the preparation for compliance with those requirements should be initiated in due time to avoid a big lag between the date of entry into force and the actual implementation by Members.

WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS)

5.6 The Council agreed that WIGOS, supported by WIS, should continue as a WMO Strategic Priority Area for the next financial period. Noting the difficulties in implementing WIGOS in some of the developing and least developed countries, the Council requested that increased priority be given to supporting the capacity development for WIGOS in these areas.

5.7 The Meeting was informed that the Council recognized the importance of the free and unrestricted exchange of data and products necessary for the effective implementation of WIGOS, and the need to integrate observations supporting a broad range of application areas from a large and heterogeneous variety of sources, both NMHS and non-NMHS owned, into the WIGOS framework, the Council requested the Inter-Commission Coordination Group on WIGOS to investigate whether the existing data policies and protocols in place for the Global Observing System and other WIGOS components adequately covers the requirements for WIGOS, and that the Group provide a report to Cg-17 on this issue.

5.8 The Council highlighted the importance of third-party (non-NMHS) observations for Members to provide enhanced services and noted that the WIGOS integration of these data is a critical contribution to WMO, its Members and its application areas. In this regard, the Council requested the Secretary-General to re-emphasize to Members the need to register all observing stations across all WIGOS component observing systems operating to WMO standards within their territories, providing the correct and complete coordinates of their observing stations, and to make their observations available in real-time. The Council also encouraged Members to make station identifiers available to potential non-NMHS collaborators in observations

B THE ICAO/CAEM CONJOINT MET DIVISIONAL MEETING

Information on Hazardous Meteorological Conditions, including en-route hazards

5.9 ICAO established in 2007, the Meteorological Warnings Study Group (METWSG) whose main task was to review Annex 3/Technical Regulations [C.3.1] concerning the content and issuance of SIGMET information, in order to meet the evolving needs of flight operations and in view of resolving long-standing SIGMET implementation difficulties encountered by many States. The METWSG had undertaken a trial in 2011 of the provision of SIGMET advisory information in the Africa-Indian Ocean (AFI) Region and part of the Asia and Pacific (APAC) Region, with the significant contribution of China, France and South Africa that had served as SIGMET advisory centres during the trial. In view of the positive outcomes of the trial, the Meeting noted a proposal for the establishment of the regional hazardous weather advisory systems (RHWACs) and agreed that the establishment of the RHWACs should be actively pursued.

5.10 The RHWACs to be established were intended to assist Meteorological Watch Offices (MWOs) with the provision of SIGMET information for selected hazardous weather that included, as a minimum, thunderstorms, icing, turbulence and mountain waves, but which excluded volcanic ash and tropical cyclones (given these existing volcanic ash and tropical cyclone advisory systems). The Conjoint Meeting agreed that an initial phase of issuing advisories to MWO would serve as a precursor to the next two phases of further regional hazardous weather advisory provision development.

5.11 The Meeting was informed that to assist Meteorological Services which are also Meteorological Watch Offices (MWO), the following activities would occur shortly:

1. ICAO would have a Volcanic Ash SIGMET, Volcanic Ash Advisories, and Volcanic Ash ASHTAM or NOTAM Periodic Tests on 11 and 12 December 2014. Meteorological Services in Trinidad and Tobago, Jamaica and Guyana would be asked to take part in the tests and a list of all SIGMETs issued by MWO must be submitted to ICAO no later than 2 February 2015;
2. A workshop on the preparation, dissemination and interpretation of SIGMETs, which was scheduled to occur at the ICAO Office in Mexico in November 2014, would be rescheduled to early 2015 at a venue to be announced.

Restructuring of Annex 3/Technical Regulations [C.3.1] and the development of a new PANS-MET

5.12 The Conjoint Meeting agreed that Annex 3/Technical Regulations [C.3.1] and a PANS-MET should clearly identify the following:

- a) State obligations;
- b) service provider obligations; and
- c) technical requirements for the service; and moreover,

that Annex 3/Technical Regulations [C.3.1] should specify service requirements whilst PANS-MET should specify the means of complying with the service requirements.

Amendment 77 to Annex 3/Technical Regulations [C.3.1]

5.13 The Conjoint Meeting reviewed and agreed to the proposed amendment to Annex 3/Technical Regulations [C.3.1] which should serve as the basis for Amendment 77. In regards to quality management systems for aeronautical meteorology, the proposed amendment is as follows:

~~2.2.6 Recommendation.— Demonstration of compliance of the quality system applied should be by audit. If non-conformity of the system is identified, action should be initiated to determine and correct the cause. All audit observations should be evidenced and properly documented.~~
(Present text in Annex 3/Technical Regulations [C.3.1])

2.2.6 Demonstration of compliance of the quality system applied shall be by audit. If nonconformity of the system is identified, action shall be initiated to determine and correct the cause. All audit observations shall be evidenced and properly documented. (Amended text)

Designated Meteorological Authority

5.14 ICAO's Annex 3 — *Meteorological Service for International Air Navigation*/WMO Technical Regulations [C.3.1], Chapter 2, 2.1.4 required States/Members to designate a meteorological authority to provide meteorological service for international air navigation or to arrange for the provision on its behalf. In this regard, while the operational responsibility for aeronautical meteorological service resided with the designated meteorological authority, the ultimate responsibility for fulfilling the ICAO requirements in respect of the Convention on International Civil Aviation (Doc 7300) resided with the State.

5.15 In this regard, the Conjoint Meeting took note of the practice of some States/Members to delegate the provision of meteorological service for international air navigation to a commercial entity. The meeting noted that such delegation, whilst fully in line with Annex 3/Technical Regulations [C.3.1], did not relieve the designated meteorological authority of the responsibility for safety oversight of the meteorological service provision through the maintenance of and adherence to performance standards, including quality assurance and quality control, and that the State/Member continues to bear the full responsibility for the meteorological service provided to international air navigation by that State/Member.

5.16. To this end, the Conjoint Meeting noted that some confusion remained regarding the use of the terms "Contracting State" and "Meteorological Authority" in certain provisions of Annex 3/Technical Regulations [C.3.1] and in related guidance material. It was agreed, therefore, that a review should be undertaken to provide clarification where possible in this regard. The review was not to change the intent of such provisions, particularly regarding the definition of the meteorological authority or the prerogative of the State to designate the meteorological authority.

Oversight of Aeronautical Meteorological Service Provision

5.17 The Meeting was informed that the new Annex 19 — *Safety Management*, applicable since 14 November 2013, requires the ICAO States establish and implement a safety oversight system. Annex 19 recommended that the State should use a methodology to determine its staffing requirements for personnel performing safety oversight functions, taking into account the size and complexity of the aviation activities in that State. Furthermore, it required each State to establish minimum qualification requirements for the technical personnel performing safety oversight functions and provide for appropriate initial and recurrent training to maintain and enhance their competence at the desired level.

5.18 The Conjoint Meeting agreed that there was a need for a State to ensure that the personnel performing safety oversight functions of the aeronautical meteorological service were adequately qualified as required by Annex 19 - *Safety Management*. Therefore, the Meeting recommended that ICAO urge States to ensure that the personnel performing safety oversight functions of the aeronautical meteorological service are adequately qualified and competent, meeting the requirements of Annex 19 - *Safety Management*.

THE IMPACTS OF WEATHER DURING 2014

(Agenda Item 6)

6.1 The Directors of Meteorological Services provided the impacts of weather on their countries during 2014.

6.4 On 23 December, 2013, the islands of **Dominica, Saint Lucia and St. Vincent and the Grenadines**, experienced **torrential rainfall, flooding and landslides** from an upper-level trough which extended downwards into the mid-levels of the atmosphere. In **St. Vincent** catastrophic flooding occurred in many areas, with the worst affected being in the northern leeward, central leeward and the northeastern side of the island. **Twelve (12) persons died** in St. Vincent and the damage to infrastructure, businesses, private properties and the agriculture sector was over EC\$300 million. There were **six (6) deaths** in Saint Lucia, with losses and damages estimated at EC\$266.13 million. In **Dominica** there were heavy rains on the morning of Christmas Eve, generated by the trough. This resulted in flooding, landslides and damages to roads, bridges and the housing sector.

6.3 The islands of **Anguilla, Grenada, Jamaica, Saint Lucia and Trinidad and Tobago** reported that there was deficit rainfall during the dry season and into the wet season. **Anguilla** experienced a moderate type of drought/dry spell during the period June to August 2014, which followed on the heels of a regular dry season leaving Anguilla with a greater demand for water. From the second quarter of 2014 until August, **Grenada** experienced deficit rainfall with June 2014 being the driest June in the past ten (10) years, this led to a declaration of a **meteorological drought** by the authorities until the rains in September which broke the meteorological drought. The Saint Lucia Meteorological Service use the stations at Hewanorra and George Charles International Airport to monitor drought and precipitation using the standard precipitation index (SPI). According to the SPI drought monitor, **meteorological drought conditions** started in **Saint Lucia** in March 2014 in the north of the island and by the end of May it had spread to the rest of the island. A water related emergency was declared in May and it ended in the north of the islands in September and in the south of the island in August.

6.4 **Jamaica** projected below normal rainfall over the island since January and in June the deficit in rainfall became critical. June and July rainfall in Jamaica was the lowest rainfall received since 1881, this led to pockets of drought in some places in Jamaica especially in the eastern and southern parishes. In **Trinidad** the dry season was drier than normal, the pattern continued into the wet season for the months from June to September. This led to water distributions restrictions over both islands.

6.5 **Tropical Storm Gonzalo** developed from an area of disturbed weather on 12 October and affected **Anguilla, Antigua and Barbuda** and **Sint Maarten** on 13 October. The eye of Gonzalo passed over Antigua on 13 October and over Anguilla later that day. In **Antigua and Barbuda** the strongest wind recorded was 74mph in Antigua and 60mph in Barbuda. There were many reports of slight to moderate damage including the loss of roofs, damage to utility infrastructure, unsecured properties and boats. There was the public perception that Gonzalo was a hurricane when the center passed over Antigua although the Antigua and Barbuda Meteorological Service indicated it was a tropical storm as per the advisories issued by RSMC Miami at that time. In **Anguilla** there was some damage to utility poles, electrical power lines and the loss of vegetation. In **Sint Maarten**, there was the loss of some roofs, broken tree limbs and flooding.

6.6 The **flood events** occurred in **Grenada, Saint Lucia, Sint Maarten, St Vincent and Trinidad and Tobago**. Rainfall in Grenada on 23 October, which measured 50.0mm between 6:00 - 8:00am, produced localized flooding in low-lying areas. Interaction between an upper-level and low-level trough on 8-9 November produced **floods and landslides** in **Saint Lucia**. The Meteorological Office at the George Charles International Airport in the north of the island recorded 124mm for the 24-hour period from 0000 UTC on the 8 November to 0000 UTC on the 9 November, whereas at Hewanorra in the south the rainfall recorded 91.1mm in the same period. **Sint Maarten** had floods during 7-8 November, which was produced by the same trough system which impacted on Saint Lucia. In **St. Vincent** on the morning of the 6 September, the passage of a low-level trough resulted in 83.5 mm of rainfall occurring in less than three (3) hours. This rainfall resulted in flooding in many areas including Kingstown. The entire ground floor of the E.T. Joshua Airport was inundated with more than twelve (12) inches of water, mud and debris. The airport had to be closed and did not reopen until 5:00 pm that afternoon.

6.7 In Trinidad, for October and November thus far there has been higher than normal rainfall. In November there was excessive rainfall on the east coast of Trinidad which has caused approximately TT\$ 60 million in damage to the road which runs parallel to the east coast.

PRESENTATION

Case Study on Back-up Arrangements between Belize and Cayman Islands (Agenda Item 7)

7.1 The Fifty-first Meeting of the Caribbean Meteorological Council adopted *Resolution No. 2 CMC50, 2010 – Regional Arrangements for the Meteorological Forecast and Warning Services among CMO Member States*. The Resolution stated inter alia:

Decides that the following arrangements shall apply

Member States with Weather Forecast and Warning Offices	States and Areas of Responsibility for Forecasts and Warnings
Antigua & Barbuda	The islands and coastal waters of Antigua & Barbuda, Anguilla, British Virgin Islands, Montserrat, St. Kitts & Nevis
Barbados	The islands and coastal waters of Barbados, Dominica, St. Vincent and the Grenadines
Belize	The islands, coastal waters and inland areas of Belize
Cayman Islands	The islands and coastal waters of the Cayman Islands
Grenada	The islands and coastal waters of Grenada and its dependencies (weather forecasts)
Guyana	The coastal waters and inland areas of Guyana
Jamaica	The island and coastal waters of Jamaica
Saint Lucia	The island and coastal waters of Saint Lucia
Trinidad and Tobago	The islands and coastal waters of Trinidad and Tobago; tropical cyclone warnings responsibility for Grenada and its dependencies
<p><i>By agreement between CMO and The Bahamas (non-CMO Member), the Bahamas area of responsibility for forecasts and warnings includes the islands and coastal waters of the Turks and Caicos Islands</i></p>	

Also decides that the following backup arrangements for tropical cyclone watches and warnings, Aerodrome Forecasts (TAF) for main airports and agreed upon essential products, as determined under the auspices of the WMO and ICAO, shall apply:

- (a) Antigua will take over the responsibility of Barbados with respect to the island and coastal waters of Dominica;
- (b) Barbados will take over the responsibility of Antigua and/or Saint Lucia;
- (b) Barbados will take over the responsibility of Trinidad and Tobago;
- (c) Jamaica will take over the responsibility of the Cayman Islands;
- (d) Trinidad and Tobago will take over the responsibility of Barbados with respect to the islands and coastal waters of Barbados and St. Vincent and the Grenadines;
- (e) The USA will take over the responsibility of Jamaica.

7.2 Messieurs D. Gonguez (Belize) and J. Tibbetts (Cayman Islands) developed a Memorandum of Understanding (MoU) which speaks to the roles and responsibilities of the National Meteorological Service of Belize (NMSB) and the Cayman Islands National Weather Service (CINWS). The MoU set forth the terms for the CINWS to prepare, provide and

distribute limited meteorological services on behalf of the NMSB, in the event that a catastrophic hydro-meteorological, seismic or manmade events, renders the NMSB incapable of fulfilling its local and international obligations.

7.3 Within the MoU the initiating mechanism would be through direct contact and authorization from the Director/Chief Meteorologist (or his/her designate) of the NMSB to the CINWS. The onus would be on the Director (NMSB) to contact the Director General (CINWS) for initiation of product generation. However, if twenty-four (24) hours has elapsed since the catastrophic event and no contact was made between the parties then the initiation becomes automatic.

7.4 The MoU provides to the CINWS the scope of works which it would have to complete to satisfy the national and international obligations of the NMSB, these include:

- Preparation and distribution over the Global Telecommunication System or any succeeding technology the Aerodrome Forecasts (TAFs) prepared according to WMO specifications;
- Preparation and distribution of Aviation Area Forecast via CINWS website;
- Preparation of daily Marine Weather Forecasts and posting products on CINWS website (morning and evening product);
- Establishment of a link/tab/dropdown menu on the CINWS website to post products.

7.5 The presentation also addressed the following areas:

1. Reviewing the MoU on a yearly basis;
2. Modification, variation and/or termination of the MoU;
3. Legal Liability and Indemnity to the CINWS;
4. Dispute resolution;
5. Funding;
6. The start and duration of the MoU.

7.6 The Director, Development and Regional Activities Department of the WMO recommended the following issues should be considered in the next iteration of the MoU:

1. The MoU should allow for a mechanism if it is necessary in the future;
2. It is essential the products should be defined;
3. Telecommunication facilities such as satellite phones to initiate the back-up arrangement;
4. Consideration to possible liability issues;
5. The provisions of warnings during a back-up period.

OTHER MATTERS

(Agenda Item 8)

8.1 Mr Robert Masters, Director, Development and Regional Activities Department of the WMO made a presentation to the Meeting on the Country Profile Database, which was under development and would soon be launched by the Secretary General of the WMO.

8.2 The Country Profile Database (CPDB) was developed in order to fulfil a mandate of Congress 15 (2007), which required WMO to:

- Gather the information collected by individual WMO Programmes and Departments;
- Optimize the number of questionnaires sent to the Members;
- Track the needs for assistance and development of the NMHSs to better target development resources and in applying for additional resources;
- Ensure Members have access to the information contained in the database, especially with regard to their own country and NMHS.

Congress 16 added a further requirement that the CPDB have a sustainable updating mechanism.

8.3 Within the sixteen Member States of CMO there are three classes of Members which are described in the following table.

Independent Member States of WMO Type I	Member Territory of WMO – British Caribbean Territories (BCT) Type II	Independent <u>Non-Member</u> States of WMO Type III
1. Antigua and Barbuda 2. Barbados 3. Belize 4. Dominica 5. Guyana 6. Jamaica 7. Saint Lucia 8. Trinidad and Tobago	1. Anguilla 2. British Virgin Islands 3. Cayman Islands 4. Montserrat 5. Turks and Caicos Islands	1. Grenada 2. St. Kitts & Nevis 3. St. Vincent and the Grenadines

8.4 In the current status of the CPDB, Type I countries are shown as separate countries like all other WMO Members. There is no indication in the CPDB that they are part of CMO. Type II and Type III countries are not currently in the CPDB. A proposed solution for the Type II and Type III could be as follows:

1. Each BCT country (Type II) would have individual entry under BCT. The Permanent Representative of BCT with WMO would assist in ensuring the information is valid/up-to-date;
2. For non-WMO Members (Type III), the information for each country could be validated by the Coordinating Director of the CMO, if so agreed between the Type III countries and CMO.



CARIBBEAN METEOROLOGICAL ORGANIZATION

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES

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Kingston, JAMAICA - 22 NOVEMBER 2014

AGENDA

1. INTRODUCTION AND ADOPTION OF AGENDA
 2. STATUS OF ACTIONS FROM THE PREVIOUS MEETING
 3. TRAINING
 4. OPERATIONAL MATTERS
 - (a) WMO Annual Global Monitoring
 - (b) Migration away from Traditional Alphanumeric Code Forms
 - (c) Quality Management Systems
 - (d) Regional Telecommunication Issues
 - (e) CMO Radar Network
 5. OUTCOME/HIGHLIGHTS OF
 - (a) 2014 WMO Executive Council
 - (b) The ICAO/Came Conjoint Met Divisional Meeting
 6. THE IMPACTS OF WEATHER DURING 2014
 7. PRESENTATION
Case Study on Back-up Arrangements between Belize and Cayman Islands
 8. OTHER MATTERS
-

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES
KINGSTON, JAMAICA
22ND NOVEMBER 2014

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