

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**

Rodney Bay, SAINT LUCIA

14 November 2012

**Introduction**

1.1 At the kind invitation of the Government of Saint Lucia, the 2012 Meeting of Directors of Meteorological Services was held at the Bay Gardens Hotel, Rodney Bay, Saint Lucia on Wednesday 14th November 2012 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 would allow the Meeting to follow-up on the actions taken on 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 DMS2011 (Dominica, 2011) 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, informed the Meeting that during the intercessional period since the last Meeting of the Directors of Meteorological Services, the CIMH had completed four training courses, including the online *Continuing Professional Development* (CPD) course and twenty-six students graduated from the five courses. There were six persons who graduated from the University of the West Indies (UWI), Cave Hill Campus at the Baccalaureate level with a major in meteorology. This included **Ms Jodanna La Borde** of St. Vincent and the Grenadines who attained the **Proxime Accessit to Dean’s Prize** and **Systems Consulting Limited Prize** in Mathematics.

3.2 The Meeting was informed that, starting from March 2013, the Entry-Level Meteorological Technician (ELMT) and the Mid-Level Meteorological Technician (MLTM) courses would be merged. The primary reason for the merger was to reintroduce Basic Mathematics and Physics into the ELMT course to bring it in line with WMO recommendations for Basic Instructional Package for Meteorological Technicians (BIP-MT). This meant that the EMLT course would be extended by three weeks to twenty weeks; however, the MLTM would remain an eight month course.

3.3 It was pointed out that WMO had recently published the *Manual on the Implementation of the Education and Training Standards in Meteorology and Hydrology* (WMO No 1083), which was the approved replacement for WMO No 258, *Guidelines for the Education and Training of Personnel in Meteorological and Operational Hydrology*. The publication provided the course outline that allowed Meteorological Services the ability to ensure that their staff could meet the aeronautical meteorological personnel competencies. Meteorological Services had until 2013 to physically demonstrate that their personnel who were Aeronautical Meteorological Forecasters and Aeronautical Meteorological Observers, had satisfied the competency requirements and until 2016 to also demonstrate that the Aeronautical Meteorological Forecasters were qualified as stated in the WMO No. 1083.

3.4 The CPD course, which was initiated by CIMH at the specific request of its Board of Governors, was conducted for the first time between September 2011 and April 2012. The course was designed to address the need to have Aeronautical Meteorological Forecasters assessed and for them to access continuing professional development, as required by the ISO 9001:2008 *Quality Management System*. The course was also designed to correct errors which were seen during Aerodrome Forecast (TAF) Verification exercises conducted during previous years. The course started with ten participants, of whom one received a distinction. There were six credits since, unfortunately, three persons did not complete the course. The results of the course indicated that there were gaps in basic dynamics, satellite interpretation and the writing of Aerodrome Forecasts (TAFs).

3.5 It was the opinion of one Director that the reasons for the non-completion of the course were due to the start time of the course, which was in the middle of the 2011 hurricane season and that some the participants could not manage both their operational duties and the course load, especially during the morning period of their shift work. The **Principal** reminded the Meeting of the budget constraints that CIMH was experiencing and that the Lecturer’s workload had to be balanced between classes at the Institute, the University of the West Indies and the new online CPD course. The Principal also stated that during the recent Board of Governors Meeting that preceded this Meeting, the request for the recruitment of an additional person to lecture to the participants enrolled in online CPD was not granted. Hence, the heavy workload on the existing lecturer would continue.

3.6 CIMH had received permission from the National Weather Service of the United States of America to configure a stand-alone version of its TAF Climatology program. The program would assimilate thirty years of aviation observations (METAR) into an observational climatological database, which would simulate Conditional Climatology Tables (CCTs), indicating weather trends over several hours and allowing for graphical manipulation of data. The CCTs would provide the Forecaster with a statistical probability of an event and allow for the determination of likely changes in flight conditions under different circumstances. This program would be beta-tested during 2013.

3.7 The Meeting was informed by some Directors of problems that surfaced during the installation of the CIMH TAF Verification program (CIMH TafV). However, other Directors indicated that no problems surfaced during the installation in their Meteorological Service. It was recommended that Services which were having problems with the software contact the CIMH for resolution.

**THE CMO RADAR NETWORK**

(Agenda Item 4)

4.1 The Meeting was reminded of the Regional Radar Project that had been funded by the European Commission with a budget of 13.2 million Euros. The Project constructed and installed four new digital weather radars in the Caribbean to replace the old and obsolete radar network installed by the CMO. It was intended to link the new radars with others already in place to form a modern network of nine radars as part of the Caribbean Early Warning System for severe weather conditions.

4.2 The telecommunication problem which was reported on during the 2011 Meeting of the Directors of Meteorological Services was solved through the collaboration of the Headquarters Unit, the Barbados Meteorological Service and the United States National Weather Service (NWS). The collaboration allowed the radar data from the 400km scan to reach the GTS through the NWS servers in Washington. The problem which was identified was a requirement to have included in the message, the file size in a specific format before the WMO header. However, the changes in the BUFR message to include the file size would result in additional work for Météo-France to create a code that would automatically remove that line within the BUFR message, before it could include Barbados radar data in the mosaic.

4.3 Belize, Barbados and Guyana were commended by the Chairman in having the radars working without any major down time during 2012. The ***Acting******Director*** *of Trinidad and Tobago Meteorological Service* indicated that there were several issues with the radar system in Trinidad which led to it being non-functional since 28th October 2011. These included:

1. The Uninterrupted Power Supply (UPS) was disabled during a thunderstorm and it was believed that that the problem started with a lightning strike;
2. Moisture build-up in the radar system.

4.4 The Acting Director further indicated that Trinidad and Tobago spent approximately TT$ 200,000.00 thus far on repairing the radar system, starting with the UPS and then other radar components, such as the radar control processor and the receiver. The Trinidad and Tobago Meteorological Service intended to enter into a contract with the manufacturer SELEX for an engineer to be in Trinidad for a period of three days, with the necessary system parts as identified by the technicians of the Meteorological Service to repair the radar system.

4.5 The **Chief Hydrometeorological Officer** *of the Guyana Hydrometeorological Service* indicated that a similar problem had occurred in Guyana in the past, so they purchased a secondary UPS system as a back-up. She further indicated that the Service had recently contracted SELEX to provide training on both the software and hardware components of the radar system, which was scheduled to start on 14th November and it would be for a period of three days on each component. The **Chief Meteorologist** *of the Belize National Meteorological Service* also indicated that refresher training would be of benefit to that Service.

4.6 The Chairman was asked by the Acting Director of Trinidad and Tobago Meteorological Servicewhether there was any requirement for advance factory training for technicians, as had been included in a report submitted by technicians in Trinidad. The Chairman indicated that in the completed EU-funded Radar Project, there was no discussion about the requirement for any advance factory training for technicians. However, if a radar host country wanted to provide any advance factory or fresher training to the technicians, they could enter into an agreement with SELEX. He was of the opinion that any such training should be conducted on site on the radar system that had been installed in the radar host country, but that SELEX should be contracted to provide the training.

4.7 The view was expressed by the Meeting that the Headquarters Unit should coordinate further technician training with SELEX for in-country training and communicate the agreed training dates with the radar host countries. This training was to assist the radar host countries maintain the cadre of technicians who are able to perform maintenance tasks on the radar.

4.8 The **Director** *of the Barbados Meteorological Service* inquired about the inventory of radar spares for the Barbados radar, which was held at the CIMH. The **Chairman** indicated that these radar spares were stored separately from the Depot Spares at CIMH, which were to be accessed on a supply and replace basis. Further, the CIMH had created a digital register of the spares which were stored at CIMH; however, the procedure to access the spares seemed not to be understood by the various parties.

4.9 The Meeting discussed the need to have the technicians in the radar host countries communicate with each other to share their radar problems and corrective solutions. The Meeting expressed the view that an Internet portal should be set-up which would make this interaction possible. This could help reduce the time in which the radars were offline and it would allow for the shared experience to build capacity. Another Internet-based technology which could be explored to facilitate this communication is SKYPE.

4.10 The **Representative** *of the World Meteorological Organization* (WMO) indicated that the CMO Radar Network was of great interest regionally with some of the larger countries hoping to emulate the Network. It was indicated that there would be a WMO technical meeting in Costa Rica *on WMO Information Systems/WMO Integrated Global Observing Systems* (WIS/WIGOS) towards the end of November 2011, in which one part of the discussion would be on a regional demonstration project in the sharing of radar data.

**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 2012 monitoring folder on WMO’s ftp server, where digital results were posted, indicated that only Dominica had posted results at that time. The Meeting was informed that Guyana had prepared their results in paper format to be sent to WMO. The Meteorological Services were urged to participate in the AGM.

5.2 The Meeting was also presented with the results of the 2011 AGM, which showed that with the exception of the stations in the Cayman Islands, Dominica and Guyana, 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 and Dominica were between 45 to 90% of the expected observations and the stations in Guyana were silent.

5.3 More than 90% of the TEMP (Upper air) observations in Barbados, Belize, Cayman Islands, Jamaica and Trinidad were received and the results indicated that the upper air station in Guyana was silent. However, Guyana does not have an upper air station. Therefore, the Permanent Representative of Guyana should send correspondence to WMO to have the information published in WMO No. 9 – Volume A corrected.

**(b) Quality Management Systems - Levels of preparedness**

5.4 The Finland-funded Project, "*Strengthening Hydrometeorological Operations and Services in the Caribbean SIDS* (SHOCS)," held two (2) workshops on the "Implementation of a QMS to aviation weather services,” during 2011." The first was held at the Caribbean Institute for Meteorology and Hydrology (9-13 May) and the second was held in Saint Lucia (5‑9 December). The report that was produced at the conclusion of the second workshop indicated that most of the countries which participated had improved in their level of preparedness towards seeking ISO 9001:2008 Quality Management Systems (QMS) certification.

5.5 The **Representative** *of the International Civil Aviation Organization* (ICAO) indicated that during missions within the English-speaking Caribbean, the levels of preparation were observed. The Representative further indicated that implementation of a QMS will become a requirement on 15 November 2012 and certification of the QMS will most likely become a requirement in November 2016.

5.6 The Meeting was informed that the QMS certification process was not difficult; however, it could be time-consuming depending on the level of readiness of the Service. Generally, the process towards certification was as follows:

1. Request a quotation from a certification organization and enter into a relevant agreement: Most certification organizations operate through websites where a quotation could be requested;
2. Submit your documentation which would be reviewed and a report provided (an on-site visit could be required). This could be iterated several times until the documents were at QMS standard;
3. Prepare for the Registration Assessment: The time depends upon the number of employees and/or locations the Service has, the type of processes which are controlled, etc;
4. Correct any deficiencies noted by the audit team;
5. Receive your certification.

5.7 The certifying organization would usually provide a quotation for multiple years. Hence, they would become the external auditor of the Meteorological Service. A list of organizations that provided certification is provided in **Annex III**. For internal auditors, recommendations have been made to the Headquarters Unit for a pool of internal auditors to be created from different Meteorological Services of CMO Member States, including CIMH, to perform the internal audits necessary.

**(c) Transition to Table Driven Code Forms**

5.8 The Meeting was reminded of the WMO plan for the migration towards Table Driven Code Forms (TDCF). The Migration Plan called for the complete migration of the SYNOP, TEMP, PILOT and CLIMAT code forms (category 1 observations) to BUFR **by November 2010**. However, no RBSN station of CMO Member States had migrated to TDCF, thus far. Also, the NWS of USA expects to finish its migration to TDCF for category 1 observations by October 2013.

5.9 The migration of the aviation code forms i.e. METAR, SPECI and SIGMET to TDCF was expected to be completed by November 2016. The **Representative** of *ICAO* indicated that ICAO prefers to have the aviation code forms migrate to either eXtensible Markup Language (XML) or Geography Markup Language (GML) and this has been communicated to WMO. Testing was due to start in late 2012 and continue for the next three years. Implementation of the XML or GML data format would occur in November 2016 and it will become a requirement in 2019.

### 5.10 The Director of the *Antigua and Barbuda Meteorological Service* indicated a preference for a BUFR encoder/decoder program written for the Windows operating system instead of the Linux operating system. The Meeting was informed that there were three free encoder/decoder programs available from ECMWF, the NWS and the [National Institute for Space Research](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&ved=0CC8QFjAA&url=http%3A%2F%2Fwww.inpe.br%2Fingles%2F&ei=04akUL66C46K0QH92oHoBA&usg=AFQjCNFsCoiHWT50B10qlV4i0i8laSRQgg) (INPE) of Brazil. ECMWF offered a Linux-based program, the NWS offers a UNIX-based program and INPE offers a Windows-based program. The Headquarters Unit would provide the URL to the Meteorological Services to access the programs and, where it could, provide information to the Information Technology units of the various Services.

**(d) Status of the RMTN - post ISCS**

5.11 The transmission of all observations, along with other data and products via "International Satellite Communications System" (ISCS), ceased on 30 June 2012. Prior to the cessation of the transmission of data, Meteorological Services were advised to register to access the *WAFS Internet File Service* (WIFS), which would provide aeronautical meteorological data and products. To access WMO RA IV related weather information in BUFR, GRIB, alpha-numeric text, and T4-FAX data types, it was necessary to register with the Global Telecommunications System (GTS) Internet File Service (GIFS).

* 1. After 30 June 2012, a number of Meteorological Services of CMO Member States indicated that there were problems in retrieving data from the GIFS server. The problems most of the Services were having were related to data availability in a timely manner. The Meeting was provided with the URL for the GIFS server which was **https://ra4-gifs.weather.gov/data/** and shown the data which was available.
  2. The Meeting was informed by the ICAO Representative that not all of the Meteorological Services had registered with the Federal Aviation Administration (FAA) to access the WIFS server. Therefore, the data which they received from other sources was not “official data” and neither was guaranteed to be comprehensive, nor timely.

5.14 The issue of redundancy of the WIFS and GIFS systems was raised by the **Acting Director** of the*Trinidad and Tobago Meteorological Service* because they are Internet-based systems using push/pull mechanisms. The FAA and the NWS have redundant systems for the WIFS and GIFS servers and these are the GeoNetCast-Americas broadcast and Emergency Managers Weather Information Network (EMWIN), both of which were via satellite. Redundancy would have to be built within each country to transmit and receive data if at present there was no redundant system.

**(e) Common Alerting Protocol**

5.15 The Common Alerting Protocol (CAP) is a simple but general format for exchanging all-hazard emergency alerts and public warnings over all kinds of networks. It allows a consistent warning message to be disseminated simultaneously over many different warning systems, thus increasing warning effectiveness while simplifying the warning task. It also addressed the long-standing need to coordinate dissemination mechanisms for warnings and alerts.

5.16 The World Meteorological Organization (WMO) has established a Register of WMO Members Alerting Authorities via **http://www-db.wmo.int/alerting/authorities.html**. Each WMO Member entry shows the alerting authority's organization name; the types of authoritative messages issued by the organization; the geographic area for which messages were typically issued; and, Internet addresses offering these messages in traditional formats or CAP format.

5.17 CAP serves as a kind of universal adaptor for alert messages. The standard message format has the features essential for both existing and emerging alert systems and sensor technologies. This means that CAP could replace many single-purpose interfaces between alert sources and dissemination media.

5.18 A key benefit of CAP for sending alert messages was that the sender could activate multiple warning systems with a single input. Using a single input reduces the cost and complexity of notifying many warning systems. CAP also provides consistency in the information delivered over multiple systems. The importance of people getting the exact corroboration of warnings coming through multiple channels could not be overstressed. Research has found that people do not typically act on the first warning signal, but would begin to look for confirmation. Only when convinced that the warning was not a false alarm, would people act.

5.19 The United Nations Development Programme (UNDP) Office for Barbados and the Organization Eastern Caribbean States (OECS), under a project entitled “*Overseas Countries and Territories* (OCTs) *Regional Risk Reduction Initiative* (R3I)” were using Anguilla’s CAP System as a model to roll-out similar CAP systems to the Disaster Management Agencies in the British Virgin Islands, the Cayman Islands, Montserrat and the Turks and Caicos Islands. The CIMH and Japan International Cooperation Agency (JICA), under the JICA CADM Phase 2 Project, were supporting CAP for watersheds in Saint Lucia, Belize, Dominica, Grenada and Guyana.

**OUTCOME/HIGHLIGHTS OF THE WMO EXECUTIVE COUNCIL**

(Agenda Item 6)

6.1 The Meeting was made aware of a number of matters which were discussed at the sixty-fourth session of the Executive Council of the World Meteorological Organization, held in Geneva, Switzerland from 25 June to 3 July 2012.

**Disaster Risk Reduction Programme (DRR)**

6.2 The DRR Programme has developed a two-tier work plan, which included:

1. The development of guidelines, standards and training modules on DRR thematic topics based on documentation and synthesis of good practices; this is linked to
2. Coordinated DRR and climate adaptation national/regional capacity development projects that would assist the National Meteorological and Hydrological Services (NMHSs) to deliver meteorological, hydrological and climate services within a comprehensive service delivery framework, underpinned by quality management framework principles.

6.3 The Council requested that the development of guidelines, standards and training modules for NMHSs for provision of products and services to support risk-based decision-making and disaster risk financing be pursued as a matter of priority. It stressed that these areas are critical for the development of national DRR and climate adaptation policies, institutional and financial planning and operations, for which access to meteorological, hydrological and climate services is essential.

6.4 The progress of the implementation of the coordinated DRR and Climate Adaptation national/regional projects underway in the Caribbean, was noted by Council. It was informed that in the Caribbean, the assessment of the capacities, gaps and needs in risk assessment and Multi-Hazard Early Warning System (MHEWS), particularly with respect to the provision of information and services for meteorological, hydrological and climate-related hazards in the Caribbean, was completed. Development of projects to address the needs identified in the assessment has been initiated.

**Global Framework for Climate Services (GFCS)**

6.5 It was stressed at the Executive Council that the success of the GFCS was dependent on partnerships with those agencies that play a leading role in the pillars of the GFCS, as well as the priority areas of the GFCS.

6.6 The Executive Council was pleased to note that an initiative for the development of an *Atlas on Health and Climate Risks* was under development with the World Health Organization (WHO), while partners such as the International Federation of Red Cross and Red Crescent Societies (IFRC), the Food and Agriculture Organization (FAO), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations International Strategy for Disaster Reduction (UNISDR), and the World Food Programme (WFP), had shown strong support to the GFCS.

6.7 Council examined the proposed terms of reference of the Intergovernmental Board on Climate Services (IBCS), which would be established under the GFCS and developed several proposals for consideration by the WMO Extraordinary Congress. Various sources of funding and the terms of the GFCS Trust Fund were considered by Council. It recognized that implementation of the GFCS will require resources. Funds would be required to support (a) the institutional structure of the GFCS including the Board and its sessions, a Secretariat, the substructure and activities of the Board, as well as (b) the project activities that will deliver outcomes around the priority areas.

6.8 The Council recognized that Congress would approve the GFCS main principles, the implementation plan and budget allocation from the WMO regular resources (assessed and voluntary contributions of the Members), and that any matter having additional financial and operational implication on all Member States and Territories should be reported to Congress.

**Aeronautical Meteorology Programme**

6.9 Aeronautical meteorology is a priority for the WMO because, for many NMHSs, the aviation sector is a crucial client on which the viability of many NMHSs depended. The Executive Council was informed that there were many challenges for NMHSs in providing services to the aviation sector. These are reflected in the five top-level priorities of the WMO Commission for Aeronautical Meteorology, which are:

1. Implementing a QMS, noting the ICAO implementation deadline of 15 November 2012;
2. Undertaking competency assessment of Aeronautical Meteorological Personnel (AMP);
3. Improving the efficiency and effectiveness of SIGMET issuance;
4. Improving services to aviation in particular for high-density airspace and aerodromes;
5. Improving Members’ ability to respond to volcanic ash and other large-scale, high impact events, e.g. space weather and nuclear incidents.

6.10 The Council was informed of a perceived lack of Internal Auditing capabilities needed for conformance with the ISO 9000 series of QM Standards, and noted that mutual QMS audits “twinning or mentoring” involving qualified internal auditors from nearby Members would be a cost effective solution. Such a ‘twinning’ or ‘mentoring’ framework was expected to particularly help Small Island Developing States and LDCs to satisfy ISO principles of an independent audit.

6.11 Noting the deadline for the implementation of AMP Competency Standards of 1 December 2013, as given in the revised edition of the WMO *Technical Regulations*, WMO-No. 49, Vol. I, the Council was informed of rapid progress in the implementation of the CAeM Competency Assessment Toolkit. The important role that Regional Training Centres (RTC) have in the successful implementation of the AMP Competency Standards was recognized.

6.12 The Council was informed that ICAO was developing a final proposal for a global or multi-regional concept of operations for regional SIGMET advisory centres and that such a concept could become part of a longer term solution. Members were strongly encouraged to review their capacity to issue SIGMETs on the basis of such advisories and encouraged those Members concerned to make best use of the available SIGMET guidance.

**Education and Training Programme**

6.13 The Council received with appreciation the report of the 25th session of the EC Panel of Experts on Education and Training (ETR Panel), Pune, India, 26 to 30 March 2012.

6.14 The Panel recommended, inter alia, that:

* + - * A review of the future role and operation of RTCs with no new RTCs to be considered until after the review is finalized. All reconfirmations and the two new RTCs recommended by this Panel session only to be approved to 31 December 2015.
* To ensure that Members can more readily demonstrate that the Basic Instruction Package for Meteorologists (BIP-M) and for Meteorological Technicians (BIP-MT) courses conducted by their training institutes meet the BIP-M/MT requirements, all Regional Training Centres and national training institutes should have a Quality Management Framework or approved accreditation process in place, or follow the ISO 29990 guidance for “Learning services for non-formal education and training - Basic requirements for service providers.”

6.15 Members were urged to act quickly to ensure that the necessary actions are taken to meet the impending deadlines for Aeronautical Meteorological Personnel competency standards (1 December 2013) and BIP-M related requirements (1 December 2016).

**SPECIAL TOPICS**

(Agenda Item 7)

1. **SHOCS Project - Phase II**

7.1 The Meeting was informed about the SHOCS Project – Phase II which had an overall objective of ensuring that Caribbean societies were better prepared, able to manage risks related to severe weather and hydro-meteorological hazards. Societies have also attained stronger resilience to the adverse impacts of climate and long term natural hazards.

7.2 Phase II would have several components which would include:

1. Improving the operational capacity of Caribbean Small Islands Developing States (SIDSs) to provide weather and climate services;
2. Improving the capacity of NMHSs and National Disaster Organizations (NDOs) for the governance of the early warning systems and the DRR process.
3. **Météo-France "Sherpa" Extranet Platform**

7.3 The European Commission operates a programme, referred to as its INTERREG Programme, aimed at increasing collaboration between the Departments of France in the Caribbean and other Caribbean islands. Under this Programme, the Commission has a project called the “Caribbean Cluster on Natural Risks and Risks from the Sea”, commonly called the Carib Risk Cluster, which was being implemented by the General Council of Martinique.

7.4 The Carib Risk Cluster was formed to facilitate the sharing, pooling and implementation of good practices, based on lessons learnt and practical experiences on a series of themes such as:

* + Earthquake-resistant reinforcement works;
  + Landslide management;
  + Forecasting, Monitoring and Warning Systems.

7.5 The Caribbean Meteorological Organization, Météo-France and the Carib Risk Cluster plan to collaborate to implement *Météo-France’s* “SHERPA” initiative in the Caribbean. The “SHERPA” initiative was designed as a knowledge dissemination project within the Carib Risk Cluster, through a web-based platform to share data from meteorological sources such as radar, wave-riders, satellites and numerical weather programs. Training would be provided to Meteorological Services, in order that there was optimal use of the products and to ensure that there was consistency within the neighbouring early warning systems.

1. **Regional Lightning Detection System**

7.6 Lightning detection networks have been established worldwide for the protection of life and property. Studies have estimated that globally there are 24,000 fatalities and 240,000 injuries each year due to lightning, although these statistics are very difficult to verify. In addition, many billions of dollars in damage and avoidance costs are incurred internationally every year. On the global scale, the lightning discharge could be detected in using the very low and low-frequency power spectrum with only magnetic field based detection. This yields very good results on the synoptic scale. However, for meso-scale detection, time-of-arrival methodologies using the constant time difference in the arrival of the low frequency signals to the ground-based sensors are used to calculate the locations of cloud-to-ground lightning events and to give more accurate results. During the Meeting, the Vaisala’s time-of-arrival Global Lightning Detection network was demonstrated.

1. **Caribbean Tsunami Warning System**

7.7 Mrs Christa Von Hillbrandt-Andrade, Manager of the US NWS *Caribbean Tsunami Warning Program* and Chair of the UNESCO-IOC *Coastal Hazards Warning System for the Caribbean and Adjacent Regions* (CARIBE EWS), gave a presentation on the Caribbean Tsunami Centre which was to be set-up in the Caribbean Region. At present, the Pacific Tsunami Warning Center (PTWC) was responsible for issuing alerts and watches to all Caribbean States with the exception of the Virgin Islands and Puerto Rico. The West Coast and Alaska Tsunami Warning Center (WCATWC) was responsible for providing alerts, watches and warnings for the Virgin Islands and Puerto Rico. The watch issued by the PTWC to the Caribbean States was equivalent to a warning issued by the WCATWC.

**The IMPACTS OF WEATHER DURING 2012**

(Agenda Item 8)

8.1 The Directors of Meteorological Services provided the impacts of weather on their countries during 2012.

8.2 The **Cayman Islands** experienced **excessive rainfall** during its dry season from mid-latitude frontal systems. On March 4th and 5th, a frontal system produced 97.3mm of rainfall. In April there was record rainfall. Total rainfall for the month was measured at 188.0mm, which was 583% above the climatic normal of 32.3mm; the pattern continued into May. The total rainfall recorded for the month was 450.1mm, with 328.2mm of rainfall being measured during the twenty-four hour period which ended at 1900 LST on 21st May. **Tropical Storms**, **Ernesto** and **Isaac**, along with **Hurricane** **Sandy**, produced rainfall over the Cayman Islands, with Ernesto and Sandy causing warnings to be issued.

8.3 In **Dominica**, rainfall was generally below the climatic normal except for the months of July and August. The passage of **Tropical Storm Ernesto** caused the Commonwealth to be placed under a tropical storm watch on 1st August; this was elevated to a warning on 2nd August and discontinued on 3rd August. On 9th August, **Tropical Depression #7** formed to the east of the Windward Islands; a tropical storm watch was issued on 10th August when the system was 630 miles east southeast of the islands. On 11th August, the depression degenerated into a tropical wave and the watch was discontinued. **Tropical Depression #9** formed to the east of the Windward Islands on 21st August and a tropical storm warning was issued for Dominica. The depression was upgraded to **Tropical Storm Isaac** later that day. On 22nd August at 1700 LST, the center of Isaac was 50 miles to the north of Dominica, but by 0800 LST on 23rd August, the warning was discontinued with the center of the storm approximately 225 miles to the west. A tropical wave, which would eventually organize into **Tropical Storm Rafael**, produced windy and rainy conditions over Dominica during the period 11th-13th October. The highest gust of 70 km/h was measured at Melville Hall.

8.4 **Jamaica** was threatened by three tropical cyclones during the 2012 Atlantic Hurricane Season. The first was **Tropical Storm Ernesto**, which passed to the south of Jamaica, producing the highest rainfall in the north-eastern districts of amounts between 200-450mm. **Tropical Storm Isaac,** which passed over Haiti and western Cuba, produced rainfall in the north-eastern districts between 200-420mm. **Hurricane Sandy** made landfall on eastern Jamaica on 24th October at 1400 LST. The maximum sustained wind was measured at 85 kmph, with gusts to 115 km/h. The maximum twenty-four hour rainfall was 282.6mm. This produced flooding and landslides in some districts. **One person** **was killed** when a boulder was dislodged and it rolled into his home and crushed him.

8.5 During 2012, St Kitts/Nevis experienced excessive rainfall on three occasions. In **St** **Kitts**, excessive rainfall occurred on 14th April with 100.5mm measured due to a **frontal trough**, while on 31st July, 80.9 mm was measured associated with a **tropical wave**. **Tropical Storm Rafael** produced 312.8 mm of rainfall during the period 13th‑15th October; this led to **flooding** in Basseterre. The damage caused by Rafael in St. Kitts was estimated to be EC$ 2,519,894. In **Nevis**, only two systems produced significant rainfall totals. A **trough** which passed by 4th May, produced 62.5 mm of rainfall and **Tropical Storm Rafael** produced a three-day total of 185.9 mm during same period as St. Kitts. The flooding which ensued from Rafael produced damage estimated at EC$ 418,847.

8.6 **Flash flooding** events occurred frequently in **Trinidad**. The worst in terms of damage occurred on 11th August, when the interaction of the **Inter-Tropical Convergence Zone** (ITCZ) and **Tropical Depression #7** produced copious rainfall in the upper reaches of the Diego Martin Valley. The rainfall caused massive **flooding and landslides** which led to the **death of two persons**. Damage from that event was estimated at TT$ 200,000,000. There was also some riverine flooding on 13th June.

**OTHER MATTERS**

(Agenda Item 9)

9.1 **Ms Susanna Scott** of the OECS Secretariat gave a presentation on “*Development and Establishment of a Regional Marine Monitoring and Forecasting System for the Organization of Eastern Caribbean States (OECS),*” which was a Project to reduce the risks to human and natural assets resulting from climate change. The focus islands for the Project are Antigua and Barbuda, Dominica, Grenada, St. Kitts/Nevis, Saint Lucia and St. Vincent and the Grenadines.

9.2 The main objective of the Project was the establishment of a permanent, relevant marine monitoring and forecasting system that would allow decision makers and other stakeholders to address climate change impacts and it would contribute to the sustainable development goals of OECS Member States.

9.3 The Project decided that their definition of “marine monitoring” was monitoring any one of the following elements:

* + sea level rise
  + sea temperature
  + ocean acidification
  + waves
  + currents

9.4 Ms Scott asked the following five question of the Meeting:

1. Are you aware of any marine environmental monitoring taking place within your organization or country?
2. To fulfill your mandate, what marine environmental forecasts do you require?
3. Are you aware of any marine environmental forecasting taking place within your organization or country?
4. Would your organization be willing to contribute to the sustainability of a future marine monitoring and forecasting system for your region by hosting a component of the system?
5. Does your organization possess technical expertise in the fields of marine monitoring; marine forecasting; or environmental data management?

9.5 Under the storm surge component of the Projects, the aim was to provide forecasts in the on waves and currents.

9.6 **Mr Adrian Trotman**, Chief of Applied Meteorology and Climatology at the CIMH, provided an information presentation to the Meeting on a Project entitled “*Rescue and Digitization of Meteorological and Hydrological Data Project*”, which was funded by the Caribbean Development Bank. The presentation was based on the draft report of the database management consultant on the “*Protocols and Policies for data sharing and dissemination”.*  The report summarized interviews conducted by the consultant with the Meteorological Services in Antigua and Barbuda, Barbados, Jamaica, Saint Lucia and Trinidad and Tobago, along with the CIMH and the Data Design Team.

9.7 The main issues of the report were:

* Sovereignty and data ownership: Individual Meteorological Services needed to know who was using their data and how. There was a need to establish ownership and user expectations;
* Value of data: None of the Meteorological Services could recover costs of providing data into their operating budgets. If costs were recovered it goes to their Government’s “general revenues”;
* Others issues related to station numbering and database mirroring: Metadata for the stations were generally unavailable and not specifically locatable. The NMSs rely on local copies and human involvement for backups. Offsite backups if it existed were ad-hoc. NMSs were aware of mirroring, but it seemed to be viewed as a costly alternative.

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**RODNEY BAY, SAINT LUCIA**

**14TH NOVEMBER 2012**

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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

**ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES Doc. 1(a) Rev1**

Rodney Bay, SAINT LUCIA - 14th NOVEMBER 2012

**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
   1. WMO Annual Global Monitoring
   2. Quality Management Systems - Levels of preparedness
   3. Transition to Table Driven Code Forms
   4. Status of the RMTN - post ISCS
   5. Common Alerting Protocol
6. OUTCOME/HIGHLIGHTS OF THE 2012 WMO EXECUTIVE COUNCIL]
7. SPECIAL TOPICS
8. SHOCS Project - Phase II
9. Météo-France "Sherpa" Extranet Platform
10. Regional Lightning Detection System
11. Caribbean Tsunami Warning System - Meteorological Services dissemination of warning products and sea level products
12. The IMPACTS OF WEATHER DURING 2012
13. other matters

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