



**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**

**Revised
REPORT OF THE**

**ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL
SERVICES**

Kingstown, ST. VINCENT AND THE GRENADINES

26 NOVEMBER 2007

INTRODUCTION

1.1 At the kind invitation of the Government of St. Vincent and the Grenadines, the 2007 Meeting of Directors of Meteorological Services was held at the Ministry of Foreign Affairs, Kingstown, St. Vincent and the Grenadines, on Monday 26th November 2007 under the Chairmanship of Mr Tyrone Sutherland, Coordinating Director of the Caribbean Meteorological Organization (CMO). The meeting was addressed by Mr. Godfred Pompey, Permanent Secretary, Ministry of Finance, Economic Planning, National Security, Legal Affairs, Grenadines Affairs, Public Service and Energy who welcomed the participants to St. Vincent and the Grenadines.

1.2 Mr. Pompey noted that the Caribbean Islands are vulnerable to tropical storms and hurricanes and it is also seeing possible changes to climate. He stated, "Our region continues to be impacted. Changes to our seasons are a reality – no longer can we boast of distinct seasons (wet and dry). The question is, what is the cause (s) of such changes? The debate continues." He also noted that with all of these changes and developments, the role of the Caribbean Meteorological Organization in assisting National Meteorological Services to enhance their services to the public and other special users cannot be questioned.

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

THE 2007 HURRICANE SEASON (Agenda Item 2)

2.1 The 2007 Hurricane Season was an above normal season with fourteen (14) named storms, four (4) hurricanes and two (2) intense hurricanes. The accumulated cyclone energy (ACE) was forecast to be between 140% - 200% above the median on 9th August. However, ACE as measured to 26th November was just 75% of the median, indicating that in terms of energy measurement, 2007 is a below normal season. As had been traditional, the Meeting discussed the impact of the season on the individual Member States and the overall effectiveness of the region's warning system for hurricanes and other severe weather.

2.2 The summary below focuses on the main systems to affect the CMO Member States. Preliminary statistics on the weather systems are also provided:

- The 2007 Atlantic Hurricane season started in May with one sub-tropical storm Andrea which developed in the Western Atlantic Ocean near Florida;
- June produced the two tropical storms Barry and Chantal, which developed in the Gulf of Mexico and the Western Atlantic respectively;
- August produced three tropical cyclones in the Atlantic, hurricanes **Dean and Felix**, and tropical storm Erin. Dean was the first category 5 hurricane to make landfall this season;

- September was very active with seven named cyclones and one depression forming in the Atlantic Basin, in addition **Felix** which formed during August became an intense hurricane in September and became the second category 5 hurricane to make landfall during the season;
- October produced tropical storm **Noel**, which brought torrential rainfall to Cuba, The Bahamas, Haiti, Santo Domingo and the Turks and Caicos Islands. **Noel** also produced flooding and landslides in Jamaica and there were two deaths. Antigua received its most rainfall from the system in its embryonic stage.
- **Dean** developed from a tropical wave in the eastern Atlantic and became a tropical storm on 14th August and a hurricane on 16th August. The centre of hurricane Dean passed between **Martinique** and **St. Lucia** as a category 2 hurricane at 0935UTC on 17th August. Tropical storm warnings were issued for the Member States of **Anguilla, Antigua and Barbuda, Barbados, the British Virgin Islands, Grenada and its Dependencies, Montserrat, St. Kitts/Nevis, and St. Vincent and the Grenadines**, as well as the islands of Saba, St Eustatius and St. Maarten. Hurricane warnings were issued for **Dominica, Martinique and St. Lucia**. Dean later threatened **Jamaica, the Cayman Islands and Belize** where hurricane warnings were also issued. The northern extreme of the eyewall of Dean brushed the southernmost peninsula near Portland Bight in Jamaica and the Belize Meteorological Service estimated winds of hurricane strength impacted on the northern part of the country. During its passage through the Caribbean, there were twelve (12) deaths attributed to the hurricane; one death each in **St. Lucia** and the Dominican Republic, two (2) deaths each in **Dominica, Martinique, and Trinidad and Tobago** and four deaths in **Jamaica**. People were also reported missing in Haiti. Infrastructural and agricultural damage in **Belize** was estimated at US \$23 million.
- **Felix** formed from a tropical wave to the east of **Grenada** on 31st August and its centre passed approximately twelve miles to the north of the island. Felix strengthened into a hurricane on 1st September and passed to south of Jamaica on 3rd September as a category 5 hurricane. Felix made landfall on the Nicaraguan coast to the north of Puerto Cabezas. In its passage through the Caribbean, there were flooding and landslides in **Grenada, Trinidad and Tobago**, which also destroyed a concert venue in Grenada. **Jamaica**, experienced coastal flooding from sea swells and wave action. Downdrafts from the thundershowers removed roofs in Trinidad, Grenada and **St. Lucia**; however, no lives were lost.

PRELIMINARY 2007 HURRICANE SEASON STATISTICS

NAME	DATES	MAX WIND (MPH)	DEATHS
Tropical Storm ANDREA	09 – 10 MAY	50	0
Tropical Storm BARRY	01 – 02 JUN	55	0
Tropical Storm CHANTAL	31 JUL – 01 AUG	55	0
Hurricane DEAN	13 - 23 AUG	165	40
Tropical Storm ERIN	14 – 16 SEP	40	0
Hurricane FELIX	30 AUG – 04 SEP	165	101
Tropical Storm GABRIELLE	07 – 11 SEP	50	0
Hurricane HUMBERTO	12 - 13 SEP	85	1
Tropical Storm INGRID	12 – 17 SEP	45	0
Tropical Depression TEN	21 -22 SEP	35	0
Tropical Storm JERRY	23 – 24 SEP	40	0
Tropical Storm KAREN	24 – 29 SEP	70	0
Hurricane LORENZO	25 - 28 SEP	80	3
Tropical Storm MELISSA	28 – 30 SEP	45	0
Tropical Depression FIFTEEN	11 – 12 OCT		
Tropical Storm NOEL	28 OCT -02 NOV	60	108

2.3 Representatives of Barbados, Belize, Dominica, Grenada, Jamaica, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago made presentations of the passage and impact of Hurricanes Dean and Felix on their countries, which were highly appreciated by the Meeting.

2.4 All Directors gave brief reports of the impact of the hurricane season on their countries. It was clear that, in addition to the impact of the many tropical storms and hurricanes, the year was marked by the excessive rainfall received through most of the year. Most States experienced several major flood events resulting in landslides, crop damage and some loss of life. Guyana reported severe thundershowers and minor flooding in low lying areas from the passage of tropical cyclones through the Eastern Caribbean Islands. St. Vincent and the Grenadines noted a number of funnel clouds during a specific period during the year, which caused damage to homes. In Dominica a funnel cloud produced some damage to Stevenson screen of the Meteorological Service.

2.5 The Director of the Barbados Meteorological Service indicated that there were two instances where advice provided by the US National Hurricane Center for the issuance of watches/warnings was not consistent with the level of threat from the tropical cyclones and was therefore rejected.

THE MEETING:

Expressed condolences to the countries that suffered from the impacts of the hurricanes, as well as the loss of life and damage from all the other systems this year;

Commended the Meteorological Services of Barbados, Belize, Dominica, Grenada Jamaica, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago for their timely and accurate warnings for their countries and areas of responsibility during 2007 hurricane season.

TRAINING
(Agenda item 3)

3.1 The Principal informed the Meeting that during 2007 twenty-three (23) new students entered the Meteorology programme at Caribbean Institute for Meteorology and Hydrology (CIMH). Eighteen (18) were registered for the Entry-Level Technician course, and five (5) were registered for the Mid-Level Technician course. A major concern to CIMH was the non-receipt of the reports of those students which participated in the Entry Level Technicians Programme from the previous year. It was noted that non-delivery of these reports hindered the progress of the graduates, as certificates could not be awarded until the reports were received.

3.2 CIMH was accepting enrolment in the Senior-Level Technician course which was scheduled to start in January 2008 and the Entry-Level Technician course to start in February 2008. There are indications that there maybe sixteen (16) students enrolling in the Senior-Level Technician course.

3.3 The Meeting was informed that the two (2) students who completed the Senior Level Technician in June 2007 were only able to achieve the pass grade. Some students had expressed concern about some of the mathematics and physics courses in the Senior-Level Technician programme, which appeared to have some merit. This issue was being addressed by the Principal and the Chief of Meteorology. However, it was also noted that some students entering some programmes were very weak academically. CIMH would be making the mathematics and physics syllabuses available to the Directors of National Meteorological Services for preparatory work by prospective students.

3.4 The Principal expressed concern about the small number of pupils who were enrolled in the Hydrology Programmes. Only two (2) students were enrolled in the General Technician and Higher Technician courses during 2006 which were completed in 2007. Three (3) students completed the Hydrology Observers Programme in 2007 and an effort was made to attract high-school students to Water Resources Management programmes. Six students completed a modified version of the Hydrology Observers programme for a nominal fee of BD \$ 200.00, from an enrolment of ten (10).

3.5 The Meeting discussed the economic cost paid for students from the Bahamas Weather Service to be enrolled in the Senior-Level Meteorological Technician programme. The Principal informed the Meeting that the fee was approximately BD \$ 25,000 per student, which was approximately the economic cost of a student attending the Cave Hill Campus of the University of the West Indies (UWI). However, it was noted that the programme content as taught by CIMH was equivalent to five or six semesters at UWI.

3.6 The Meeting expressed the view that given all most Member State of the CMO are island nations there is a need for marine meteorology training especially at the Senior-Level Technicians programme. The Principal indicated that the CIMH explore ways to deliver this component of meteorological training.

THE MEETING:

Noted the cost paid by the Bahamas Weather Service for the enrolment of its student in the Senior-Level Meteorological Technician programme;

Recommended that the Principal explore methods to have the true economic cost calculated and paid.

CMO OPERATIONAL METEOROLOGY ADVISORY GROUP (COMAG)

(Agenda Item 4)

4.1 The Meeting was reminded of the establishment of the CMO Meteorological Advisory Group (COMAG) during the Forty-fifth Meeting of the Caribbean Meteorological Council. It was noted that the membership of the first COMAG included senior operational meteorologists from the countries of Antigua and Barbuda, Barbados, Belize, Guyana, St. Vincent and the Grenadines and Trinidad and Tobago, along with training personnel from CIMH.

4.2 COMAG had its first meeting on 26 – 27 February 2007 and **Ms. Sonia Nurse** and **Mr. George Braithwaite** were elected to the position of **Chairman** and **Vice-Chairman** respectively. Mr George Braithwaite gave a presentation on the Report of the first meeting of COMAG including its recommendations to the Meeting.

4.3 The presentation reviewed the region's Meteorological Services readiness to service the 2007 Cricket World Cup and made recommendations on the format and forecast products which were eventually made available to the Local Organizing Committees in the nine countries that participated in the event.

4.4 COMAG recommended to the annual meeting of the Directors of the Meteorological Services that they begin to implement the quality system which is in conformity of the International Organization for Standards (ISO) 9000 series of quality assurance. This recommendation on quality standards from the World Meteorological Organization (WMO) and the International Civil Aviation Organization (ICAO) will become a requirement in November 2010.

4.5 The Advisory Group also recommended to the Meeting that the Directors should pursue a verification of the Terminal Aerodrome Forecast (TAF) which is an integral part of the quality management system, noting that both ICAO and WMO recommend that the service provider should not be the Agency responsible for the verification process (see Agenda item 5).

The Meeting

Noted, the recommendations of COMAG;

SCIENTIFIC TOPIC - CMOTafV- TAF VERIFICATION
(Agenda Item 5)

5.1 Ms. Kathy-Ann Caesar gave a presentation on the CMO Terminal Aerodrome Forecast (TAF) Verification (CMOTafV). The initial work on CMOTafV was completed with the assistance of students at CIMH. Verification methods from United States of America, Canada and United Kingdom were reviewed. The *Aviation Verify/Tafver 2.0* programme from the National Weather Service for the United States was readily available and one that could be easily retooled for use in the Caribbean region.

5.2 This programme was written by Andrew Rorke (NWS LOX) and found to have much of the features required by the Caribbean region. **Aviation Verify** and its upgrade **Tafver 2.0** evaluate TAFs with respect to the observed conditions, available from the hourly METAR reports and model output statistics (MOS). It is a Microsoft Excel based program, thus it is easily integrated on COROBOR system or any computer with a Windows operating system. Additional programming needed to extract and store data from the COROBOR system, as well as to format the extracted data into a form easily read by the Tafver programme was written by Ms. Kim Whitehall of CIMH. .

5.3 Data from the forecast offices in Barbados, Belize, Cayman Islands, Grenada, Guyana, Jamaica, St. Lucia, and Trinidad and Tobago was used to test the program. The data included METAR and TAF from the months of June and July 2007. Additional analysis was done for the same stations and Guyana, with data for September and October. It should be noted that to make any decisive conclusions on the results for this program, at least two (2) years worth of data must be collected and analyzed.

5.4 The program evaluated the data in three (3) major aeronautical categories, namely:

1. Visibility – horizontal visibility in accordance standards
2. Ceiling – the lowest cloud three (3) oktas or more
3. Flight – The combination of ceiling and visibility for different flight rules

The program produced statistical output such as probability of detection (POD), false alarm rate (FAR), the percentage of correct TAFs and the percentage of incorrect TAFs.

5.5 The results from the verification program indicated that most of the Weather Forecast/Warning Offices (WFWOs), with the exception on one, produced a correct forecast 40% of the time or better throughout the 24 hours period for each month, in the elements of ceiling and flight category and, 50% or better in visibility forecasts. There was one exception where the statistics results for a correct forecast from the WFWO did not exceeded 25%, and this was consistent for the data used. The percentage of incorrect TAFs was indirectly proportional to the percentage correct. No conclusions can be made based on the statistics produced thus far; however the initial results dido raise a measure of concern, especially where percentage of incorrect forecasts were high, since it had direct implication of the safety of aircraft operations.

The Meeting

Noted, the results of the verification;

Requested the Advisory Group to seek other verification algorithms through the World Meteorological Organization;

Also requested the Advisory Group to continue its work on the TAF verification process and report to the next Meeting of the Directors of Meteorological Services.

THE CMO RADAR PROJECT IMPLEMENTATION

(Agenda Item 6)

6.1 The Meeting was provided with an overview on the status of the 13.2 million EURO CMO Radar Project funded by the European Union. The Project officially started on 18 December 2003 and the implementation phase must be completed by 30th June 2009.

6.2 Members noted the activities which were implemented during 2007 and the challenges caused by the cessation of construction and resumption of construction in Guyana and the delays in the production of calculations of the strength of the existing building and architectural drawing for the renovations in Belize.

6.3 The Coordinating Director commended the Government of Guyana for their timely intervention ensuring that the problems which caused the Project to halt construction was eliminated and the payment of the civil works contractor to bring the new radar site to the level of the old site before construction was halted.

6.4 There was discussion on the best method to provide the Internet service to allow user access to the radar data by the radar host countries. It was recognized that there was the need for different levels of security for different users and that there would be security issue concerning password protected servers and password sharing by users.

THE MEETING:

Noted the challenges facing the Radar Project;

Urged the radar host countries to complete the necessary network infrastructure and web development prior to the installation of the radars.

OPERATIONAL MATTERS
(Agenda item 7)

7.1 The Meeting was made aware of several matters, which were particularly related to the operations and the services delivered by Meteorological Services in the Caribbean.

(a) Telecommunication - EMWIN Systems

7.2 The Meeting discussed the training and systems provided by the US National Weather Service (NWS) on the Emergency Managers Weather Information Network (EMWIN) during March and July 2007, with funding through the "*Third Border Initiative*" of the State Department of the USA. Directors also discussed the changes to the EMWIN system and its expansion in the Caribbean and noted that the NWS would not be able to provide further EMWIN systems and training unless additional funding was sourced.

7.3 Mr. Moolchan of the Trinidad and Tobago Meteorological Service indicated that they were unsure as to the progress of the change to the new EMWIN system and had halted the purchase of their systems. There was also discussion on the functionality of some of the systems deployed and the quality and timeliness of the data. The CMO indicated that the data requirements of the Caribbean region were provided to an officer of the US National Weather Service and the President of Regional Association IV; however, this information never reached the correct personnel in the NWS with responsibility for the EMWIN data stream. The CMO Headquarters undertook to again provide the data to the NWS.

(b) AWS Data on the GTS/Internet

7.4 The Chairman noted that the data from the automatic weather stations (AWS) which were provided by the SIDs-Caribbean Project with the exception of St. Vincent the Grenadines and one station in Jamaica were not available to the meteorological community through the Global Telecommunication System (GTS) of the World Meteorological Organization or on their websites, which was not in keeping with the stated aims and objective of that Project. The Chairman proposed that Services make efforts to have the data for all their AWS made available in real time.

(c) WMO Annual Global Monitoring

7.5 The Chairman noted that many of the Meteorological Services of Member States which contribute to the WMO Regional Basic Synoptic Network (RSBN), did not participate in the WMO Annual Global Monitoring (AGM), which monitors the data disseminated over the Global Telecommunication System. Meteorological Services were urged to participate in the AGM. Results from the 2006 monitoring indicated that the Regional Telecommunication Hub received data from the nine members of the RSBN ranging from 0% to 70%.

(d) Tsunami Template for National Meteorological Services

7.6 The Meeting discussed the tsunami template as prepared by the CMO Headquarters and the template was accepted. The template was based on that used in Trinidad and Tobago. The template is attached in **Appendix III**.

(e) WMO Information System (WIS)

7.7 An overview of the WMO Information System (WIS) was presented to the Meeting indicating the intended transition from the present closed Global Telecommunication System, with the duplication of data through other telecommunication technologies such as the Internet, to an open system where data sharing can be a scheduled event or through requests. The Meeting was also made aware that to facilitate the proper use of WIS, a significant amount of capacity building would ensue.

7.8 Mr. Fred Sambula gave a presentation of the recently concluded Inter-Commission Coordination Group on the WMO Information System (ICG-WIS), which reviewed the project plan and the implementation of WIS.

The Meeting

Noted the EMWIN systems and training provided to Meteorological Services by the State Department of the United States of America through the National Weather Service;

Urged Meteorological Services which had automatic weather stations especially from the SIDs-Caribbean Project, to have the data transmitted on the GTS and archived at CIMH;

Commended the Meteorological Services which participated in the WMO Annual Global Monitoring;

Further Urged the Meteorological Services which had not participated in the WMO Annual Global Monitoring; to do so in the future;

Recommended to the Caribbean Meteorological Council that the template developed for a Tsunami Early Warning System (TEWS) be adopted and used by Member States.

PROJECT UPDATES/PROPOSALS

(Agenda item 8)

8.1 The Meeting was reminded of the Carib-HYCOS Project which was developed in the form of two components; one covering the continental countries and the other the Islands States. Proposals were presented and endorsed by the Fortieth Session of the Caribbean Meteorological Council (Barbados 2000).

8.2 WMO and the Institut de Recherche pour le Développement (IRD) of France promoted the project regionally in March 2002 and after further consultations WMO/IRD prepared a project document for the Caribbean Islands Component (Carib-HYCOS/CIC). A workshop to discuss this proposal was held in Martinique in December 2004 with representatives of Barbados, Cuba, Dominican Republic, Guadeloupe, Haiti, Jamaica, Martinique, Trinidad and Tobago.

8.3 The project proposal was reviewed and recommendations made regarding the project implementation. It was agreed that the Project Regional Centre (PRC) will be located in Martinique and that the Caribbean Institute for Meteorology and Hydrology (CIMH) would collaborate with the PRC to provide support to the English speaking countries.

8.4 The Meeting also noted that, notwithstanding the review of the Project's proposals and recommendations in December 2004, the Project was inactive during 2005 and 2006. However, in June 2007, WMO and IRD finally signed an agreement for supervision and implementation of the Project.

8.5 It also noted that only the CMO Member States of Barbados, Jamaica, and Trinidad and Tobago had expressed an interest in participating in Carib-HYCOS. The Chairman suggested to the Director of the St. Lucia Meteorological Service that this Project will complement their existing flash flood warning system and St. Lucia should consider participation.

The Meeting

Noted the resumption of the Carib-HYCOS Project with the signing of the agreement for the supervision of the Project;

Also noted only the countries of Barbados, Jamaica and Trinidad and Tobago had expressed an interest in participation;

Urged other Member States of the CMO to participate in the Carib-HYCO Project.

RESULTS OF THE FIFTEENTH WORLD METEOROLOGICAL CONGRESS (Agenda item 9)

(a) Global Telecommunication System (GTS)

9.1 The Meeting noted the operational arrangements made by the World Meteorological Organization (WMO) to support to tsunami warning systems for the prompt distribution of warnings and the collection and exchange of sea level, deep-ocean tsunami detection and seismic data. A review of the routing mechanisms for messages and files on the Global Telecommunication System (GTS), in order to improve the exchange of high priority data and products in support of a virtual all hazards network within the GTS, would be undertaken by the WMO Commission for Basic Systems (CBS).

(b) Radio Frequencies for Meteorological Activities

9.2 The current radio frequency allocations and regulatory provisions of the International Telecommunication Union (ITU) Radio Regulations, which addressed the requirements for meteorological and related environmental activities through specific radiocommunication services, were noted.

9.3 The Coordinating Director informed the Meeting that the September 2007 ITU World Radio Radiocommunication Conference had provided continuing protection for existing meteorological frequencies. However, because there would continue to be pressure for space on the radio spectrum, Meteorological Services was urged to actively participate in radio frequency activities, especially the preparation of World Radiocommunication Conference issues, conducted by their national telecommunication administrations, by regional radiocommunication organizations.

(c) Tropical Cyclone Programme (TCP)

9.4 The Tropical Cyclone Programme (TCP) continued to give priority to capacity building, which is essential for a sustained augmentation of the tropical cyclone warning services provided by NMHSs, particularly in Small Island Developing States (SIDS) in the tropical cyclone basins which are especially vulnerable to tropical cyclones. In this respect, WMO placed a high value on continuation of the co-sponsorship by WMO for the annual RA IV Workshops on Hurricane Forecasting and Warning organized by NOAA at the RSMC Miami.

(d) Aeronautical Meteorology Programme

9.5 WMO Secretariat stressed its continued efforts in support of the introduction of Quality Management Systems that would be needed in particular for developing countries. It intended to support the implementation of at least one demonstration project in a suitable Member country.

9.6 The importance of cost recovery for the provision of aeronautical meteorological services was stressed. This was a vital source of continued funding for Developing Countries. The lack of coordination and clear guidance from relevant government departments for air navigation service and national meteorological service providers for aviation had hindered the implementation of cost recovery mechanisms for some Meteorological Services.

9.7 The introduction of the new two-tier-system of the classification of meteorological personnel required a significant effort to ensure that aeronautical meteorological personnel fully comply with the new guidelines. Information provided by the United Kingdom on this matter indicated that there is some ambiguity in the classification of personnel. National and Regional Training Centres involved with the specialized training needs of aeronautical meteorological staff should cooperate closely with Universities on the development of appropriate degree courses.

9.8 It was noted that there was intensifying pressure from user groups, air traffic management authorities and ICAO to reorganize airspace and Flight Information Regions (FIRs), and thus the Meteorological Watch Offices responsible for the issuance of SIGMETs and AIRMETs, into larger blocks both for the sake of harmonizing warnings and reducing costs. Serious concern was expressed about the implications of such tendencies for smaller and developing countries.

(e) Education and Training Fellowships

9.9 Concern was expressed about low-level of response from beneficiary countries in providing feedback on the fellows' performance upon their return home. The decision taken by the Fifty-eight Session of the Executive Council (June 2006) was endorsed that no further fellowship awards would be considered for the Members whose Permanent Representatives (PRs) do not provide the required post-fellowship reports.

9.10 The Revised Criteria for the Award of WMO Fellowships, which was approved by the Fifty-eight Session of the Executive Council, made it a requirement that the PRs nominating candidates for long-term fellowship must establish a clear connection between the human resources development plan of the concerned NMHS and the intended outcomes of the requested fellowship.

(f) Natural Disaster Prevention and Mitigation Programme

9.11 The WMO Natural Disaster Prevention and Mitigation Programme was a new cross-cutting programme designed to support a multi-hazard early warning systems. The multi-hazard early warning systems would encompass the Tropical Cyclone Programme as well as the new tsunami warning systems which were being developed. The WMO GTS was recognized as the backbone for information exchange in support of multi-hazard early warning systems. Collaboration between WMO and UNESCO-IOC would be strengthened to support tsunami early warning systems in regions at risk. The need for enhanced ocean observations for improved tsunami detection and warning was also noted.

OTHER MATTERS

(Agenda Item 10)

10.1 The Director, of the Barbados Meteorological Service indicated that there was no formal document providing details for the provision of meteorological services to the countries of Dominica and St. Vincent and the Grenadines. The Coordinating Director offered to host a meeting in 2008 between two (2) representatives of the Barbados Meteorological Service and a representative of the Meteorological Service and National Disaster Organization from Dominica and St. Vincent and the Grenadines. A similar meeting would be organized for the islands supported by the Meteorological Service of Antigua and Barbuda. These meetings were expected to produce documents which formalize the expectations of all parties.

10.2 The Senior Meteorological Officer of the Dominica Meteorological Service informed the Meeting of instances where the Head of the Office of Disaster Preparedness in Dominica placed the country in an alert status for severe weather episodes when there were no such alerts issued by the Barbados Meteorological Service or the Dominica Meteorological Service. This issue would be resolved through the meetings expected to be held under the auspices of the CMO Headquarters highlighted in paragraph 10.1.

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES
MINISTRY OF FOREIGN AFFAIRS, KINGSTOWN, ST. VINCENT
26th NOVEMBER, 2007

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CARIBBEAN METEOROLOGICAL ORGANIZATION

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES
Kingstown, ST. VINCENT 26th NOVEMBER 2007

Doc. 1

AGENDA

1. INTRODUCTION
 2. THE 2007 HURRICANE SEASON
 3. TRAINING
 4. CMO OPERATIONAL METEOROLOGY ADVISORY GROUP (COMAG)
 5. SCIENTIFIC TOPIC
 - (a) CMOTafV - TAF Verification
 6. THE CMO RADAR PROJECT IMPLEMENTATION
 7. OPERATIONAL MATTERS
 - (a) Telecommunication –EMWIN Systems
 - (b) AWS data on the GTS/Internet
 - (c) WMO Annual Global Monitoring
 - (d) Tsunami Template for National Meteorological Services
 - (e) WMO Information System (WIS)
 8. PROJECT UPDATES/PROPOSALS
 - (i) CARIB-HYCOS
 9. WMO CONGRESS ISSUES
 10. OTHER MATTERS
-

TSUNAMI TEMPLATE FOR NATIONAL METEOROLOGICAL SERVICES

1. A sensor network capable of detecting an oceanic earthquake and impending tsunamis in the Atlantic Ocean and the Caribbean Sea, is feasible, but it will be useless unless backed by improved communications infrastructure in the countries in the greatest peril.

2. An early warning system for tsunamis is already in operation in the Pacific Ocean and consists of a network of seismographs, tidal gauges and deep assessment and reporting tsunamis (DART) buoys, linked via satellite to monitoring centres based in Alaska, US, and Hawaii. A similar system is expected to be deployed in the Atlantic Ocean and the Caribbean Sea.

3. Seismographs provide the first line of defense, alerting monitoring staff to any earthquakes large enough to produce a tsunami. However, not all earthquake of such magnitude produce these deadly waves, so tidal gauges, which record changes in ocean depth, are then used to determine whether a tsunami is actually on its way. However, a problem with the system is that three in four tsunami alerts are false alarms. Evacuations in such cases are costly and can breed complacency.

4. Having the knowledge of an impending tsunami is useless, without the ability to warn the population in time. The real problem is what happens after a tsunami warning is transmitted, which is an infrastructure problem. If a tsunami is generated, you've have to get the information down to the last person on the beach, which is very difficult.

5. At the international level, the World Meteorological Organization in its approach to a multi-hazard warning system has offered its Global Telecommunication System (GTS) and the communication platform for the transmission of warning to countries at risk. National Meteorological Services are to be the focal point for the warning at the national level for the country's internal warning centre. However, for warnings to effective at the national level, there must be the involvement of all stakeholders in the development of action plan especially for fast paced events such as tsunamis.

6. A country through its National Disaster Organization (NDO) needs to involve all stakeholders in a disaster risk assessment exercise to create an Emergency Alert System (EAS), which identifies the following:
 1. Communities at risk from a tsunami
 2. Possible extent of damage from different run-up scenarios
 3. Identification of muster points for evacuation purposes
 4. Methods to be used to continually build community awareness
 5. Methods to be used to communicate the warnings between relevant agencies
 6. Methodology to be used to communicate the warnings to the communities at risk
 7. Focal points within the communities to receive and disseminate the warning
 8. After event assessment

7. Presently, nine Member States of the Caribbean Meteorological Organization have workstations which received transmission from the GTS. These workstations can be configured to give an audible warning and a print out of the tsunami warning issued for the Atlantic region. The warning on the GTS will have the following headers for configuration.

	Message Header	Explanation
a)	WEXX20 PAAQ	Tsunami Warning
b)	WEXX22 PAAQ	Tsunami Information Statement
c)	WEXX30 PAAQ	Public Tsunami Warning
d)	WEXX32 PAAQ	Public Tsunami Information Statement
e)	SEXX60 PAAQ	Tsunami Information Statement (Earthquake Information)

8. Tsunami warnings will be issued for the Atlantic Ocean and the Gulf of Mexico when there are earthquakes of magnitude greater than 6.8. When there earthquakes of magnitude greater 6.4 in the Atlantic Ocean and the Gulf of Mexico an Earthquake Information Statement (SEXX60 PAAQ) will be issued.

9. Six of the remaining seven (7) Member States of the CMO were provided with EMWIN receivers in 2003, which will also be used to transmit tsunami warning simultaneously with the GTS. These systems are also configurable to give an audible warning and a printout when a warning is received. It can also be configured to transmit the warnings to selected pagers and emails upon receipt.

10. Upon receipt of tsunami watches and warnings, the National Meteorological Service, must activate the EAS via the identified communication platform. The watch/warning from the EAS must be broadcasted via television, AM/FM radio, cable television etc. simultaneously.

11. Upon receipt of tsunami watch and warning messages, the community focal points can activate the EAS to evacuate low-lying coastal areas in advance of the initial tsunami wave to the pre-determined muster points.
