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

Georgetown, GUYANA

29 NOVEMBER 2008

INTRODUCTION

1.1 At the kind invitation of the Government of the Republic of Guyana, the 2008 Meeting of Directors of Meteorological Services was held at the Guyana International Conference Centre, Georgetown, Guyana, on Saturday 29th November 2008 under the Chairmanship of Mr Tyrone Sutherland, Coordinating Director of the Caribbean Meteorological Organization (CMO).

1.2 The participants introduced themselves and identified which Meteorological Service they were representing. 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**.

THE 2008 HURRICANE SEASON
(Agenda Item 2)

2.1 The 2008 Hurricane Season was above normal with sixteen (16) named storms one sub-tropical storm and one tropical depression. Eight (8) of the named storms became hurricanes and five (5) of the hurricanes strengthened into intense hurricanes. 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 To initiate discussions, a general summary of the 2008 hurricane season was presented. The summary below focuses on the main systems to affect the CMO Member States. Preliminary statistics on the weather systems are also provided:

- The 2008 Atlantic Hurricane season started in May with the remnant clouds from an East Pacific cyclone, which crossed Central America and developed into Tropical Storm **Arthur** near the east coast of Belize.

- July produced three (3) cyclones, **Bertha,** which developed in the eastern Atlantic, became the first intense hurricane of the season. **Chantal** was the second storm of the season to make landfall and **Dolly** was second hurricane of the season.

- August produced four (4) tropical cyclones in the Atlantic with tropical storms **Erin** and **Fay** and hurricanes **Gustav and Hanna**. Cyclones Fay, Gustav and Hanna made landfall on the islands of the Caribbean.

- September's activity was near normal with four (4) named cyclones forming in the Atlantic Basin. There were two (2) hurricanes, **Ike** and **Kyle**. Ike was the third major hurricane of the season and fourth cyclone to make landfall on a Caribbean island.

- October produced two tropical storms, one hurricane and a tropical depression. Hurricane **Omar** developed in central Caribbean Sea and its centre passed between the British Virgin Islands and Anguilla as it moved north-eastward into the Atlantic Ocean.

• **Arthur** developed from the remnants of the eastern Pacific storm Alma, which crossed Central America into the Caribbean Sea to the east of Belize. The centre made landfall on **Belize** on 31 May and produced torrential which lead to widespread flooding. The flooding caused the death of five persons with two others reported missing. There was damage to 714 homes and it is estimated that Arthur caused damage in excess of US$78 million.

• **Gustav** formed from a tropical wave in the central Caribbean Sea and its centre impacted on Haiti on 27 August as a hurricane. The interaction with the mountains of Haiti weakened Gustav to tropical storm strength and it was as a tropical storm that Gustav made landfall on **Jamaica** on 28 August moving across the island from east to west. The centre of Gustav exited Jamaica on 29 August and passed between **Cayman Brac** and **Grand Cayman** later that night. Gustav took the lives of fifteen (15) persons in Jamaica and caused infrastructural damage of approximately US $210 million.

• **Hanna** developed from a tropical wave to the east-northeast of Barbuda and moved to the west-northwest towards the Bahamas. On 1 August, Hanna turned towards the south and its centre passed between **Mayaguana** in the Bahamas and the **Turks and Caicos Islands** as a hurricane**.** The cyclone weakened as it turned towards the north and made landfall on **North Caicos** on 3 August as a tropical storm. Hanna produced torrential rainfall over the Turks and Caicos Islands for three (3) days, which produced widespread flooding.

• **Ike,** the strongest hurricane of the season, developed from a tropical wave in the mid-Atlantic. It moved towards the west-northwest until it reached 60°W longitude, then it gradually moved towards the west-southwest and its centre passed approximately 28 miles to the south of **Grand Turk** on 7 September as a category 3 hurricane. The centre made landfall on **Great Inagua** in the Bahamas later that day and on **Cuba** during that night. Ike affected Cuba throughout the following day. In its passage through the Caribbean Ike caused at least 61 deaths in **Haiti** and reportedly damaged 95% of the homes in the islands of **Grand Turk, South Caicos** and **Salt Cay,** 700 persons also lost their homes. On the western side of **Cuba,** more than 1000 homes were damaged, 300 destroyed and 7 lives were lost.

• **Omar** had it genesis from a tropical wave in the central Caribbean Sea. Its initial movement was towards the south east but it turned towards the northeast and passed between the **British Virgin Islands** and **Anguilla** on 15 October as a category 3 hurricane. The sheltered coastlines of the **Grenada, St. Vincent, Dominica and St. Lucia** were impacted by the swells generated by Omar. The swells damaged infrastructure, caused sea water inundation inland, damaged houses and caused the lost of sea crafts. Omar also caused flooding in **Antigua** and in the **British Virgin Islands,** along with small landslides. There were also landslides in **Montserrat** associated with heavy rainfall.

• **Paloma**, the last cyclone of the season, passed between Grand Cayman and Little Cayman as a category 3 hurricane. The hurricane caused extensive damage to the wooden houses in **Cayman Brac** and **Little Cayman**, including the loss of roofs from numerous buildings. In **Jamaica**, there was one flood related death due to the passage of Paloma.

2.3 All Directors gave brief reports of the impact of the hurricane season (rainy 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, damage to road networks and some loss of life.

2.4 The countries of **Antigua and Barbuda, Belize, Cayman Island, Jamaica** and **the Bahamas** issued cyclone watches and warnings for their respective countries and areas for which they are responsible.

2.5 In **Barbados**, **Belize**, **Guyana**, **St. Lucia**, **St. Vincent**, and **Trinidad and Tobago,** flooding also occurred from torrential rainfall associated with tropical waves, upper-level troughs and other severe weather events. The rainfall caused landslides in Dominica, St. Vincent and Trinidad and Tobago. Due to the flooding and landslides, one (1) life was lost in St. Vincent and three (3) in Trinidad and Tobago. Further there was the lost of a boat in Montserrat due to severe weather in April.

2.6 Under the long established CMO arrangement, the Barbados Meteorological Service provides forecast and warning services to Dominica and St. Vincent and the Grenadines. The Meeting examined one of the inherent weaknesses in the system. This relates to the occurrence of severe weather and the issuance of warnings during the night hours when the Meteorological Office are closed. One such incident was noted in which the Meteorological Service in St,. Vincent did note receive a crucial warning until 10 ½ hours into a significant rainfall episode which had started at 2:00am that day. The rainfall unfortunately caused a landslide which took the life of a 67 year old woman. However, the Director of the Barbados Meteorological Service reiterated that the Meteorological Office in St. Vincent was closed during the night and it would be impossible to communicate any warning in a timely manner. Further, he indicated that the onus should not only be on Barbados to contact St. Vincent but also St. Vincent should take the initiative if a severe weather situation develops and no forecast is forthcoming.

2.7 The Meeting also discussed the inadequacy in marine warnings issued for those two islands for the swells generated by Hurricane Omar, which formed in the eastern Caribbean Sea and moved north-eastward through the Northern Leeward Islands. The Meeting was of the opinion that, in view of the experience of Hurricane Lenny in 1999 which moved in similar direction in the Caribbean Seas, forecasters must pay special attention to the oceanographic conditions and potential destruction caused by these systems and must place greater emphasis on these warnings.

The Cayman Islands which have been impacted by two (2) major hurricanes during the past four (4) years had not experienced any loss of life from these systems. The representative of the Cayman Islands Meteorological Service attributed this to the pre-hurricane season planning which encompasses all stakeholders, including the Tourism Authority which regulates the hotel industry on the islands. The planning also includes a table-top exercise, drills to test the medical, civil, fire and police services ability to function before, during and after the passage of a cyclone. The hotels are mandated to make available all information to their guests which would prevent the loss of life and property by the impact of a hurricane.

PRELIMINARY 2008 HURRICANE SEASON STATISTICS

NAME	DATES	MAX WIND (MPH)	DEATHS
Tropical Storm ARTHUR	**31 MAY – 1 JUN**	**40**	**5**
Hurricane BERTHA	03 – 20 JUL	121	0
Tropical Storm CRISTOBAL	19 – 23 JUL	63	0
Hurricane DOLLY	**20 - 24 JUL**	**100**	**1**
Tropical Storm EDOUARD	03 – 05 AUG	64	0
Tropical Storm FAY	**15 - 24 AUG**	**65**	**XX**
Hurricane GUSTAV	**25 AUG – 02 SEP**	**150**	**122**
Hurricane HANNA	**28 AUG – 07 SEP**	**80**	**1**
Hurricane IKE	**01 – 14 SEP**	**145**	**92**
Tropical Storm JOSEPHINE	02 -06 SEP	65	0
Hurricane KYLE	25 – 29 SEP	80	0
Sub-Tropical Storm LAURA	29 SEP – 01 OCT	60	0
Tropical Storm MARCO	06 - 08 OCT	65	
Tropical Storm NANA	12 – 14 OCT	40	0
Hurricane OMAR	**13 – 18 OCT**	**125**	
Tropical Depression SIXTEEN	14 - 16 OCT	35	
Hurricane PALOMA	05 – 10 NOV	125	1

THE MEETING:

Expressed condolences to the all countries, including Cuba and Haiti, 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, Cayman Islands, Jamaica, Antigua, and Trinidad and Tobago for their timely and accurate warnings for their countries and areas of responsibility during 2008 hurricane season.

TRAINING
(Agenda item 3)

3.1` The Principal of the Caribbean Institute for Meteorology and Hydrology (CIMH) informed the Meeting was informed that in 2008 a CLIDATA training workshop was organized by the World Meteorological Organization and hosted by the CIMH. The workshop brought together persons in the region using the CLIDATA database and the creators of the database from Czech Republic. A user community was created, which includes personnel from the Meteorological Services of Barbados, Cuba, the Dominican Republic, Jamaica and Trinidad and Tobago. Further, the Oracle database will be upgraded, as requested by Trinidad and Tobago.

3.2 The Principal informed the Meeting that during 2009, the following courses in meteorology and hydrology will be offered:

1. Entry-Level Meteorological Technician: - Starting February 2009
2. Mid-Level Meteorological Technician: - Starting August 2009
3. General Technician Course (Hydrology): - Starting August 2009

3.3 The Principal further indicated that CIMH will be raising the awareness of its hydrology programme through:

1. Short courses related to water resources management and drought monitoring;
2. Regional water resources management projects such as CARIWIN.

3.4 The Meeting was informed that CIMH was moving towards developing online training programmes to support:

1. Professional development of staff currently employed by National Meteorological and Hydrological Services;
2. The development of an online B.Sc. programme in Meteorology.

3.5 Ms. Kathy-Ann Caesar of the CIMH has been assigned the lead on these two activities and as part of these activities, CIMH had been working with COMET to identify and develop where necessary, the materials required to support these two activities. One existing BSc programme to be evaluated as a prototype for the online programme was produced by the Mississippi State University. CIMH considered that the biggest challenge in teaching an online degree in meteorology will be the teaching of dynamic meteorology, which may not be well suited to an online environment.

3.6 Three areas have been identified for the professional development training modules, namely:

1. The use off mesoscale numerical models to support weather forecasting;
2. Radar meteorology;
3. Satellite meteorology: - interpretation.

3.6 An interest was expressed for CIMH to conduct a course in management for meteorologists and also a course in marine meteorology. The Principal indicated that discussion was ongoing with the Cave Hill Campus of University of the West Indies for a cross-facility course in management in the first year of the BSc Meteorology degree programme. Also, discussion had been initiated by the CIMH with some marine stakeholders as to how a meteorological service can best service their needs. Further, there were plans to include an introduction to ocean wave models in the Senior-level Meteorological Technician course and in the Center for Resource Management and Environmental Studies (CERMES) programme.

THE MEETING:

Noted the online training programme to be developed;

Expressed the view that the Principal explore methods to introduce the new modules without unduly increasing the financial burden on Members given the state of arrears in contributions experienced by the Institute. .

CMO OPERATIONAL METEOROLOGY ADVISORY GROUP (COMAG)

(Agenda Item 4)

4.1 The Meeting was reminded that it had requested that COMAG to pursue activities in two areas and report to the meeting of the Director of Meteorological Service in 2008. These areas are:

1. To seek other verification algorithms through the World Meteorological Organization (WMO);
2. To continue its work on the CMO TAF verification process.

4.2 WMO indicated that it has tried over a number of years to find a TAF verification algorithm that could be acceptable to most Members, and an Expert Team spent four (4) years researching the issue. The Team concluded that the current version of the TAF contains an amalgamation of deterministic and probabilistic elements which made it very difficult to come to an agreed common standard.

4.3 The Leader of the Expert Team explained that there was a poor response to a questionnaire was sent to every Member of WMO at the end of May 2006. By the deadline, only fifteen (15) responses had been received. Only eleven (11) of the respondents indicated that they documented their verification procedure and of that subset nine (9) were willing to share their documentation for reference by other Members of WMO. Of the four Anglophone respondents, COMAG was not able to get the verification scheme of Australia and South Africa.

4.4 Ms. Kathy-Ann Caesar gave a presentation on the second verification exercise of the CMO Terminal Aerodrome Forecast (TAF) Verification (CMOTafV). CMOTafV uses the verification methods developed by the National Weather Service of the United States of America. The conversion of the CMOTafV from its original form to a programme which is more acceptable to the newer versions of the Windows operating systems was completed with the assistance of students and staff of the CIMH.

4.5 The verification exercise was conducted on TAFs from the eight of the nine Weather Forecast and Warning Offices (WFWOs) in Member States of the Caribbean Meteorological Organization, for the months of May through to August 2008. Data from the Antigua's Meteorological Service was omitted from the verification exercise due to its unavailability to the CIMH on the Global Telecommunication System.

4.6 The programme produced a wealth of statistical analysis from the input data. The generated statistics showed definite trends among the Meteorological Offices. For example, the Offices which produced TAFs with a high level of accuracy for the most part in the 2007 exercise, continued this trend, while there had been significant improvement in the Office which performed poorly in the verification process in the last year.

4.7 A result which was noticeable from the verification process was the high percentage of inaccurate 'Ceiling' forecasts for most of the stations. The ceiling forecast was consistently the weakest of the three categories, while visibility was the best. The percentages of 'Flight Category' (ceiling and visibility) statistic fluctuated widely and considering the high risk, and since ceiling and visibility poses to aircraft operations and aerodrome safety, particular attention must be paid to these elements of forecasting. COMAG indicated that there was a need to closely examine the methodology used to generate TAFs in each Meteorological Service.

4.7 COMAG recommended to the annual meeting of the Directors of the Meteorological Services that:

1. CIMH be considered as the verification centre for CMO Member States;
2. CIMH be tasked with providing a detailed cost of implementing a year-long verification scheme through COMAG;
3. COMAG provides a full report to the next meeting of the Directors of Meteorological Service, detailing cost, data requirements, data transmission methodology etc for a decision on implementation.

The Meeting

Noted the recommendations of COMAG;

Decided that COMAG should communicate the results of the verification exercise to the Directors concerned.

THE CMO RADAR PROJECT – TECHNICAL ISSUES

(Agenda Item 5)

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

5.2 The Meeting noted the activities which were completed and the reasons for the delays which have occurred during radar installation in Barbados, Belize and Trinidad. The Meeting also noted that the site acceptance testing in Barbados and Trinidad had been completed. Further, the mosaic software was created by Météo-France and installation on the visual display units was completed in July 2008. The software was configured for each meteorological station to retrieve data either from the Global Telecommunication System (GTS) or an ftp server, depending on the telecommunication capability of the station.

5.3 The method of sharing the radar data was highlighted. The basic data for the radar mosaic is a scan which is completed every fifteen minutes and zero degrees elevation and at a range of 400km. Further each radar hoist country must make available radar data for the general public via their website and for the meteorological community via an ftp server.

5.4 The Meteorological Services of radar host countries had agreed to participate in a technical committee along with representatives of the other Radar Stations and the Météo-France facility in Martinique (SRMA), to determine all technical matters in connection with the Composite Service. The CMO would establish this committee in 2009.

5.5 As part of the Project training was provided to thirteen (13) technicians from the four countries and the CIMH both at the factory and in each country. The Meeting was informed that it was imperative for a mechanism to be found to network the technicians so that they could collaborate on the problems identified at each radar site, thereby continuously honing their skills.

5.6 Similarly, a methodology must be established for managing the Central Stores Facility at CIMH in Barbados, where each radar host country can have easy access to the spares, through a replacement system.

THE MEETING:

Noted the technical committee which was to be created to manage the regional composite;

Also Noted the two methodologies which must be created to assist the transfer of knowledge between the radar technicians and for the managing the Central Stores Facility.

OPERATIONAL MATTERS
(Agenda item 6)

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

(a) WMO Annual Global Monitoring

6.2 The Chairman noted that many Meteorological Services of the Member States, which have stations in the Regional Basic Synoptic Network, do not participate in the World Meteorological Organization (WMO) Annual Global Monitoring (AGM), which monitors the data disseminated over the Global Telecommunication Service (GTS). These Meteorological Services were urged to participate in the AGM.

6.3 For the 2008 Annual Global Monitoring only three countries submitted monitoring reports by the deadline of 15 November 2008. This was one less than the number which reported in 2007, but the same amount which reported in 2006. In the Special Main Telecommunication Network (MTN) Monitoring which took place in April 2008, a number of silent stations were noted in one of the CMO Member States and there were no reports for another. The Chairman urged the National Meteorological and Hydrological Services (NMHSs) to investigate the cases and to seek solutions.

(b) Migration to BUFR Code Form

6.4 The Migration Plan to binary code forms of the World Meteorological Organization (WMO) calls for the migration of the SYNOP, TEMP, PILOT and CLIMAT code forms to BUFR, to be completed by November 2010. Further the operational exchange of aviation code forms had been set to start from November 2008 and migration of these code forms to BUFR were scheduled to be completed in November 2016

6.5 The binary code forms will replace the traditional alphanumeric code form because the new systems offer expandability, self description, flexibility, sustainability and compression. The systematic passing of metadata including geographical coordinates (latitude, longitude, height) in every report, which is easily performed with the Table Drive Code Forms (TDCFs), would alleviate the notorious problem of wrong coordinates for a station. More and better quality data will lead to better data assimilation, and consequently the generation of better products by data processing centres leading to improvements in weather forecasts and climate studies.

6.6 However, the WMO Congress noted the slow implementation of the migration to TDCFs, which began on 2 November 2005; and supported the initiative taken by the Commission for Basic Systems (CBS) to increase the awareness of the benefit of the migration by the NMHSs. In this regard, the WMO Secretariat requested of each Permanent Representative with the WMO, the naming of a Focal Point for the migration to TCDFs. CMO Headquarters asked that they be given the contact information for these focal points also.

6.7 The CMO Headquarters has received so few responses to the naming of the focal points that it is unable to ascertain the state of readiness of National Meteorological Services to implement the WMO's migration plan. Hence it has posted software on its website at **www.cmo.org.tt/Bufr_Software.Bufr.htm,** which would assist Meteorological Services to decode and encode BUFR.

(c) Update on Qualifications needed as a Forecaster

6.8 WMO introduced a two-tiered qualification system for meteorological and hydrological personnel, through the publication of WMO 258 – Guidelines for Education and Training of Personnel in Meteorology and Hydrology, which went into effect from 1 January 2004. The publication defined a meteorologist as a person with a BSc degree in meteorology or a degree in a related scientific discipline and having completed the Basic Instruction Package for meteorology.

6.9 Supplement No 1: - Training and Qualification Requirements for Aeronautical Meteorological Personnel published in 2006 further refined the duties and qualifications of Aeronautical Meteorological Technicians and Aeronautical Meteorologists. The publication states: *While WMO-No. 258 explicitly acknowledges that **"in practice, some mid/senior-level technicians may perform duties that are similar or overlap with duties of entry-mid-level meteorologists"**, the training and qualification requirements for weather forecasters are only explicitly listed under the Meteorologists section.*

6.10 It also states in Section 1.3-Content and Structure: *…In any case in the context of the current WMO classification, an Aeronautical Meteorological Forecaster (AMF) is a Meteorologist specializing in aeronautical meteorology while an Aeronautical Meteorological Observer is a Meteorological Technician specializing in weather observing for aviation purposes. Operational aeronautical forecasters who had fully qualified as **"WMO Class II Meteorologist"** prior to 31 December 2004 and who continue meet all competency requirements as set out in the current Supplement would also be categorized as **AMFs**.*

6.11 The Executive Council's Panel of Experts on Education and Training, at it's Twenty-third Session (Costa Rica, March 2008), considered the processes and time lines to assist Members of the WMO to have their personnel certified to provide meteorological services for air navigation. The Panel found that it was not practical or desirable to change the underlying thrust of the fourth edition of WMO publication No. 258 and retrospectively remove the requirement that WMO Meteorologists hold an appropriate degree (or equivalent qualification) in meteorology or an appropriate science and mathematics degree and have successfully completed a condensed basic instruction package (meteorology) course.

6.12 The ICAO publication "*Meteorological Services for International Air Navigation,"* which is Annex 3 to the Convention on International Civil Aviation, states that each of its Member States shall designate a Metrological Authority to provide or to arrange for the provision of meteorological service for international air navigation on its behalf. Further, each Member State shall ensure that the designated Meteorological Authority complies with the requirements of the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for international air navigation.

6.13 ICAO also recommended that "*In order to meet the objective of meteorological service for international air navigation, the Contracting State should ensure that the designated Meteorological Authority establishes and implements a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation."* It recommended that the quality management system be ISO 9000 certified.

6.14 The certification of Meteorological Services has implications to the recurrent costs of providing services for the aviation community nationally. Additionally, the requirement for forecasters to be degree-level personnel also increases the cost incurred by countries, due to the higher level of training, the expectation of higher remuneration packages for qualified staff, adjustment in Civil Service scales, etc. However, if countries chose not to seek certification, there is the possible of loss of revenue due to the downgrading of airports.

6.15 The CMO Headquarters analyzed a survey of qualified Meteorologists in each Meteorological Service of its Member States that provide weather forecasts. There were seven (7) respondents out of the nine (9) Services surveyed and the results indicated that,: for the most part the Meteorological Service of Member states have met the training qualification. However, at the time of the survey, there was one Meteorological Service which has forecasters who achieved accreditation after 1st January 2005. Another Meteorological Service has degree personnel and one meteorological service with less than 30% of its establishment on staff.

The Meeting

Noted the performance or lack thereof of Meteorological Services in the Special MTN Monitoring

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

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

Also Noted the WMO's plan to migrate to the BUFR Code form;

Further Urged the Meteorological Service to make plans to migrate to the BUFR code form;

Further Noted that the matter of quality management and personnel qualifications in relation to aeronautical meteorology would be address by the Caribbean Meteorological Council.

SCIENTIFIC TOPIC
OBSERVATION, STORAGE AND PROCESSING PROGRAM
(Agenda item 7)

7.1 Mr Keithley Meade of the Antigua and Barbuda Meteorological Service gave a demonstration of his "*Observation, Storage and Processing Program.*" The programme collects and processes meteorological data. It can be used to calculate, tabulate, archive and query observational data. The program utilizes a series of quality assurance methodologies to detect coding errors and inappropriate ranges. It attempts to catch any violation of the standard meteorological codes. The program accepts hourly data from a user and after processing, the user saves the data to a database. The database can be queried for information or used to provide predefined reports.

The goals of the program are: to provide an extremely simple way to collect, store and process data and to access or display information; increase efficiency and, to reduce incidences of human error. In addition the program offers a simple solution to the digitization of data which is on paper.

The program consists of separate applications for *Data Entry & Processing, Query, Display and Data Management,* which interfaces with a database management system. The database was implemented using Microsoft Access database management system and it can store up to 2 Gigabytes (GB) of data. Hourly observations records stored for a year is approximately 2 Megabytes (MB).

The Meeting

Noted the programme;

Commended Mr Meade for his foresight and dedication to the development of the program;

Expressed a desire to use the program;

Urged Mr. Meade to continue its development to enable other ways of ingesting data and to pursue patent and copyright procedures on the program.

OUTCOME OF THE CGOS CARIBBEAN MISSION

(Agenda item 8)

8.1 A presentation was made to the Meeting by Mr Danny Foster, a consultant with the *Global Climate Observing System* (GCOS) of which the WMO is one of the sponsoring agencies.

8.2 Mr Foster informed the Meeting about a Strategic Implementation Planning Meeting which took place in Belize City (January 2008), to develop a road map for furthering the implementation of the GCOS. Regional Action Plan (RAP) for Central America and the Caribbean (CAC). The Meeting was co-sponsored by the GCOS Secretariat and the *Caribbean Community Climate Change Centre* (CCCCC) with participation by some 30 representatives of regional climate organisations, funding agencies and countries with a commitment to improved climate observations in the CAC region. The organs of the CMO were represented by the Coordinating Director and the Principal of the CIMH.

8.3 He indicated that during the GCOS session, the CMO noted that the surface and upper-air observatories of only a few of its Member States form part of the GCOS networks and suggested that an assessment be made of the observatories in all the CMO Member States to determine the most appropriate ones to contribute to the GCOS networks. As a result, a GCOS mission was organized to visit both the GCOS surface and upper-air stations in the countries of Barbados, Belize, Cayman Islands, and Jamaica. The mission undertaken by Mr Foster also visited the Non-GCOS stations in Antigua and Barbuda, St. Kitts, St. Lucia St. Vincent and Trinidad & Tobago.

8.4 The stations of CMO Member States can be sub-divided in GCOS Surface Network (GSN), which is made up of the stations at Grantley Adams in Barbados, Owen Roberts Airport in Grand Cayman and Montego Bay in Jamaica. There is also the GCOS Upper Air Network (GUAN), comprising the stations Belize, Barbados and Kingston, Jamaica.

8.5 The purpose of the mission was to ascertain information for three (3) distinct but related purposes:

1. Review the observation methodologies and make recommendations, if necessary, for the improvement of observing practices, meteorological equipment including communications,
2. Review of the Metadata file of the station and assist in the creation or updating where necessary,
3. To build a library of information on the station that assistance might be provided in the future.

8.6 The Mission found that the CMO GUAN observatories were self sufficient and required little support from the GCOS Technical Support Project (TSP). The TSP provided support which was not forthcoming from the National Oceanographic Atmospheric Administration (NOAA) such as identification and correction of errors in height values for rawinsonde flights, assisting in the creation of CLIMAT TEMP messages, and other support to the meteorological side of the operation.

8.7 The CMO GSN observatories were also self sufficient with little need for TSP support. The TSP can provide replacement and spare instruments for the surface observing system in the CMO, which are GCOS stations and it can work closely with them to ensure their monthly CLIMAT reports are received at the GCOS centres. He noted that in some cases the NOAA Email Distribution Information System (EDIS) was used to transmit observations to the GTS. It was indicated that during the mission he worked with the CMO GSN sites to carefully construct METADATA files and these metadata files were provided to the appropriate GCOS centre.

8.8 The Mission also found that the Meteorological Service of CMO Member States had the training and required skills to professionally operate and maintain an observatory. Further all of the Meteorological Services form part of the CMO regional activities and thus were cognizant of the changes in the wider meteorological community. The Mission found that the quality of the staff and work ethics was very high and was expected to remain that way as long education and training activities continue, but the websites of the Meteorological Services was deemed to be somewhat lacking.

Mr Foster recommended to the Meeting, that CMO provide GCOS with a list of observing stations, which could be added to the GSN and GUAN networks. The stations must be reliable and able to perform synoptic observations at 0000UTC and 12000UTC and their historical records must be in a digitized file.

The Meeting

Noted the Mission report;

Thanked Mr Danny Foster for the assistance which he has provided to the Meteorological Services in the past and during the GCOS Mission:

Agreed to follow-up on the recommendation of the Mission.

THE INTERGOVERNMENTAL GROUP ON EARTH OBSERVATIONS
(Agenda 9)

9.1 The Meeting was informed about the origins of the I*ntergovernmental Group of Earth Observations* (GEO). GEO grew out from the 2002 World Summit on Sustainable Development, where the documents issued resonated with the policy of the Group of Eight (G8). The Twenty-ninth Meeting of the G8 in Evian, France in June 2003, affirmed the importance of earth observations as a priority issue and the first Earth Observation Summit convened in Washington, D.C., in July 2003 adopted a Declaration establishing the Ad-Hoc intergovernmental Group on Earth Observations (ad-hoc GEO) to draft a 10-Year Implementation Plan.

9.2 GEO was established as a voluntary partnership of governments and international organizations. Its purpose is to provide a framework where these partners can develop new projects and coordinate their strategies and investments, in order to exploit the growing potential of Earth observations to support decision making in an increasingly complex and environmentally-stressed world.

9.3 GEO has constructed the Global Earth Observation Systems of Systems (GEOSS) on the basis of a 10-Year Implementation Plan for the period 2005 to 2015. The Plan defines a vision statement for GEOSS, its purpose, scope, expected benefits, and the nine "**Societal Benefit Areas**" of disasters, health, energy, climate, water, weather, ecosystems, agriculture and biodiversity.

9.4 GEOSS is expected to provide decision-support tools to a wide variety of users. It expected to be a global and flexible network of content providers, which allows decision makers access to an extraordinary range of information at their desk.

9.5 As of October 2008 GEO membership consisted of 76 Governments and the European Commission. In addition, 51 intergovernmental, international, and regional organizations with a mandate in Earth observation or related issues have been recognized as Participating Organizations. These Participating Organizations include the CMO, which became a member following the endorsement of the 47th session of the Caribbean Meteorological Council (St. Vincent, 2007).

A presentation was made to the Meeting, showing the products which are available from the GEOSS content providers, SEVIR and GEONETcast. The SERVIR data is freely available via the SERVIR website, however, the GEONETcast data which is also free, is available via satellites. Both the EUMETSAT and the GEONETcast of the Americas broadcast data over the Caribbean and to access the data Meteorological Service would have to purchase a GEONETcast receiving system, which cost approximately US$3,000.00.

The Meeting

Noted the report on the Intergovernmental Group on Earth Observations;

Also Noted the amount of data which is shared within GEO through SERVIR and GEONETcast and urged the National Meteorological Service to make use of these.

OTHER MATTERS
(Agenda Item 10)

The Meeting was informed by the Chairman about the impending retirement in 2009 of Mr Chester Layne, Director of the Barbados Meteorological Service. It was noted that Mr Layne had chosen to demit office before mandatory retirement due in 2010.

The Meeting

Thanked Mr. Layne for his years of Service to Meteorology in Barbados, the Region and the international community.

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ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES
CONVENTION CENTRE, LILIENDAAL, EAST COAST DEMERARA, GUYANA
29TH NOVEMBER, 2008

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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

ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES **Doc. 1**
GEORGETOWN, GUYANA - 29th NOVEMBER 2008

AGENDA

1. INTRODUCTION
2. THE 2008 HURRICANE SEASON
3. TRAINING
4. CMO OPERATIONAL METEOROLOGY ADVISORY GROUP (COMAG)
5. THE CMO RADAR PROJECT – TECHNICAL ISSUES
6. OPERATIONAL MATTERS
   - (a) WMO Annual Global Monitoring
   - (b) Migration to BUFR Code Form
   - (c) Update on Qualifications needed as a Forecaster
7. SCIENTIFIC TOPIC
   Observation, Storage and Processing Program
8. OUTCOME OF THE CGOS CARIBBEAN MISSION
9. THE INTERGOVERNMENTAL GROUP ON EARTH OBSERVATIONS
10. OTHER MATTERS