



FINAL
REPORT
OF THE
FIFTY-EIGHTH MEETING
OF THE
CARIBBEAN
METEOROLOGICAL
COUNCIL



CHAIRPERSON:

Honourable Ian Patches Liburd, Minister of Public Infrastructure, Posts, Urban Development and Transport of **St. Kitts and Nevis**

VENUE AND DATE:

Ocean Terrace Inn,
Basseterre
ST. KITTS AND NEVIS
15-16 NOVEMBER 2018

1. OPENING OF THE SESSION AND ELECTION OF CHAIRPERSON

1.1 At the kind invitation of the of the Government of **St. Kitts and Nevis**, the **Fifty-eighth** Session of the Caribbean Meteorological Council was held at the Ocean Terrace Inn in Basseterre, St. Kitts on 15-16 November 2018. The Caribbean Meteorological Council is the Governing and policy-making body of the Caribbean Meteorological Organization (CMO).

1.2 **Ms Sharon Rattan**, Permanent Secretary in the Ministry of Public Infrastructure, Posts and Urban Development and Transport of St. Kitts and Nevis, commenced the Opening Session of the Meeting by extending words of welcome after the National Anthem and a prayer. An interesting poem was also rendered to set the mood of the opening of the meeting. Ms Rattan also led a moment of silence in memory of *Mr Franklin Penn*, a delegate from the British Virgin Islands to the session of Council in 2017, who lost his life in a tragic manner in his homeland on November 22, 2017 — just days after returning from attending the 57th session of the Council in Antigua and Barbuda.

1.3 **Mr Tyrone Sutherland**, Coordinating Director of the CMO, delivered remarks that focussed on the role played by the Caribbean Meteorological Council, from its inception in 1962, and particularly after the establishment of the CMO in 1973, in fostering scientific and technical cooperation among the Member States of the Organization that contributed to the development of their Meteorological and Hydrometeorological Services. He pointed out that while there had been and would always be a focus on the operation of a very effective severe weather warning system in the regional, climate and climate-change issues had come to the forefront around the world, thus providing for the organs of the CMO with a continuous challenge to design and deliver programmes and services that support its Member States for their core services, but which also address the increasing influence of climate variability and climate change on our societies. Mr Sutherland ended his comments by formally introducing *Dr. Arlene Laing*, incoming Coordinating Director of the CMO.

1.4 **Mr Oscar Arango**, the World Meteorological Organization's Representative for North America, Central America and the Caribbean, addressed the Council on behalf of the WMO Secretary-General, *Prof. Petteri Taalas*. He made general comments on some of the weather and climate-related concerns of the Member countries of the region, and the actions underway to address them in collaboration with WMO. In this regard, he mentioned the high vulnerability of the region to natural disasters, especially hurricanes, and the activities and projects in which WMO collaborates with CMO and other regional institutions. To derive optimum benefits from such projects and initiatives, Mr Arango indicated that it was essential to further strengthen the capabilities of National Meteorological Services in operational areas related to the mitigation and early response to natural disasters and in the provision of appropriate services. He pointed to the shortages in human resources that some National Meteorological and Hydrological Services were facing in the region and the significant contribution of the Caribbean Institute for Meteorology and Hydrology to appropriately address this issue. Mr Arango finalized his intervention by thanking Mr Tyrone Sutherland for his long contribution to WMO and the Caribbean region.

1.5 The feature address was delivered by **Honourable Ian "Patches" Liburd**, Minister of Public Infrastructure, Posts, Urban Development and Transport of St. Kitts and Nevis. In welcoming delegates to the Council session, Minister Liburd noted that, among the many historic events that had taken place in St. Kitts and Nevis over the years, the Caribbean Meteorological Organization was established in Basseterre 45 years ago in 1973. He reflected on the role and function of the organs of the CMO and expressed the region's appreciation for the critical work undertaken by CMO to prepare and protect the region against ravages of adverse weather events. He noted that advances in weather monitoring from land, sea, air and space had resulted in improved weather forecasts and warnings that saved lives and minimized death tolls during extreme weather events. He pointed to the great efforts of the governments in the region, despite the costs, to ensure that their meteorological services were adequately equipped and thanked the World Meteorological Organization for its role in

working with the CMO to keep the region abreast of current and future trends in weather and climatic issues.

1.6 Minister Liburd spoke passionately about the potential impacts of changes in climate and the urgent need for the region to bring awareness to the issue of climate change from the level of scientists and environmentalists to governments and to the persons on the street. He thus urged the region to continue to build, maintain and strengthen the work undertaken by the organs of the Caribbean Meteorological Organization.

1.7 After the feature address, **Mr Ivor Daniels**, Permanent Secretary in the Ministry of Infrastructure, Ports, Energy and Labour of Saint Lucia, delivered some closing remarks and a vote of thanks to the Government of St. Kitts and Nevis for graciously hosting this Council session and related meetings and for the excellent facilities, arrangements and hospitality that would contribute to a successful Council session.

1.8 The Meeting elected Honourable Ian Liburd as the Chair of the Caribbean Meteorological Council for its 58th session and the intercessional period until the next annual meeting of the Council.

2. ADOPTION OF AGENDA AND PROCEDURAL MATTERS

2.1 The Agenda adopted by the Meeting is shown in **ANNEX I** of this Report. The Meeting fixed its hours of work and determined the order in which it would conduct its business. The list of Delegates attending the Meeting is attached as **ANNEX II** to this Report.

3. CMO EXECUTIVE REPORTS

3(a) Coordinating Director's Report

3.1 The CMO Coordinating Director presented his report on the activities and issues concerning the CMO Headquarters Unit since the previous session of the Council. The Council first engaged in a brief review of the impacts of weather in the region in 2018, noting that 2018 was quite different to the devastating year 2017. The first half of the hurricane season was relatively quiet, in which there were only four named systems by the middle of August, two of which formed well north of the area. Despite the actual quiet start of the Hurricane season, there was at least one weather "scare" for the hurricane ravaged island of Dominica in July with the formation in the Atlantic Ocean of a very small and minimal *hurricane Beryl*. Although Beryl briefly became a hurricane, it rapidly weakened to a tropical wave as it crossed Dominica without significant incident. Even in the second half of the hurricane season, in which there were several weather systems in existence at the same time in the Atlantic Ocean, these still crossed the island chain as relatively weak tropical storms, such as Tropical Storm **Kirk**. The Council recognized that the most notable weather feature of 2018 was a massive rainfall event – or "great flood" - of 19-20 October in Trinidad and to a lesser extent Tobago – not caused by a tropical cyclone in this case, but by a very active *Inter-tropical Convergence Zone* that meanders along and near the South American coast and southern parts of the island chain. Although there were no reports of loss of life from the event, the social and economic impacts on that nation of this "great flood" would be assessed for some time.

3.2 Council also discussed the regular appearance of widespread Sahara dust in the region, often trailing the many tropical cyclones. While the Sahara dust tended to minimize rainfall across the region, the health implications for persons prone to asthma and other respiratory conditions are known and were regularly included in the weather forecasts and reported on in some of the regional media. Council also took particular note that the warnings issued by the main forecast offices in the region,

along with the local alerts by the individual Meteorological Services, were most timely and appropriate for all severe weather systems in 2018.

3.3 Council took note that the relatively quiet first half of the hurricane season-related activities in 2018 allowed the CMO Headquarters to focus on the assumption of office of the next Coordinating-Director. **Dr. Arlene Laing**, selected by the 57th session of the Caribbean Meteorological Council, assumed the position of Coordinating Director-Designate from June 1, 2018. Dr. Laing was thus able to participate in and contribute to several of the activities of the CMO Headquarters that were aimed at regional implementation of many global programmes and initiatives, particularly those set-in motion by the World Meteorological Organization as they relate to the Caribbean region in general and CMO Member States in particular. Council has always recognized that, as one of the pillars of its mandate, the CMO must actively participate in WMO activities at the highest possible level in order to ensure that the interests of small developing states are accounted for and to guide and advise the CMO Member States in their own related activities. In this regard, Council was pleased that the incoming Coordinating Director was able to quickly involve herself in WMO matters along with the other CMO personnel, details of which are provided under item 5 of this Report.

3.4 The session was briefed on the continuing collaboration between the CMO Headquarters and the Caribbean Community Secretariat on aspects of the "*CMO Operational Programme 2016-2019*" and its link to the implementation of the *Caribbean Community Strategic Implementation Plan 2015-2019*. Council was informed that the CMO Headquarters would be required to report to the CARICOM Secretariat on its deliverables for 2015-2018 and its 2019 Work Plan. The next iteration of the CMO Strategic Plan was discussed in more detail under agenda item 7 of this Report.

3.5 Council recalled its discussions over the last few years concerning regional proposals to establish a *Caribbean Community Administrative Tribunal (CCAT)*. This matter was being led by the Caribbean Court of Justice (CCJ) and the CARICOM Secretariat. The primary purpose of CCAT was to develop an independent dispute settlement process for Community institutions, as many of the institutions enjoy immunity from local laws. Council discussed this aspect in some detail, recalling that it had previously examined the pros and cons of the possible involvement of the organs of the CMO in CCAT. In the process, Council noted that the CCJ and the CARICOM Secretariat had been guiding the CMO Headquarters and the CIMH on how the two separate organs of one institution would function under the CCAT, taking into account the fact that the CMO Headquarters had a small non-unionized staff and governed by a host country agreement in Trinidad and Tobago, while the CIMH was a unionized institution without a concluded Host Country Agreement in Barbados at the time.

3.6 The Principal of the CIMH informed the Council that he expected all issues pertaining to the role of the union representing its staff in a CCAT scenario to be settled before the end of 2018. In addition, it was recalled that the 57th session of the Council had decided that all pending legal issues surrounding the establishment of CCAT be completed by the CCJ and the CCS before it would make a final decision on the matter. In this regard, the CMO Headquarters had been informed by the CARICOM Secretariat that these matters had been resolved and that the governing bodies of regional institutions were requested to indicate their approval to submit to the jurisdiction of the CCAT as soon as possible, as the Caribbean Community's adoption of the CCAT statute was expected to take place in February 2019 after consideration by the CARICOM Heads of Government.

3.7 Council was given some brief background information on the *Caribbean Meteorological Foundation (CMF)*, which is one of the Organs of CMO that had never really been functional. Detailed discussions are provided under Agenda item 11.

3.8 Special tribute was paid to **Mr Marlon Noel**, who retired as the Director of the Meteorological Services Division of Trinidad and Tobago in September 2018 after a career of 36 years. Mr Noel joined the Meteorological Service in 1982 and worked in several areas, including the Synoptic and

Technical branches, before becoming the Director in 2012. The Council wished Mr Noel well in his retirement.

3.9 **The Council:**

- (a) **Noted** the activities and issues concerning the CMO Headquarters in 2018, particularly those dealing with the overlap period of the outgoing and incoming Coordinating Director of the CMO, as well as those issues concerning the wider Caribbean Community;
- (b) **Discussed** the impact of the 2018 hurricane and rainy season on the region and, in particular, the impact on CMO Member States;
- (c) **Approved** the participation of the Caribbean Meteorological Organization in the *Caribbean Community Administrative Tribunal* (CCAT) once the establishment of CCAT was approved by the CARICOM Heads of Government; **authorized** the Coordinating Director to sign the legal documents submitting the Organization to the jurisdiction of the CCAT; and, **decided** that the CMO's contribution to the operations of CCAT, for both the CMO Headquarters and the CIMH, would be included in the budget of the CMO Headquarters;

3(b) **CIMH Principal's Report**

3.10 The Principal of the Caribbean Institute for Meteorology and Hydrology (CIMH), Dr. David Farrell, presented his report to the Council on the activities of the CIMH since its last session in 2017. The Council was informed about the innovation and entrepreneurship, which was being displayed by the CIMH with the continued growth in the demand for products and services regionally and internationally.

3.11 Council was informed that CIMH could not solely depend on subvention from Member States to fund the Institute, given the annual shortfall due to non-payment of approved contributions by some Member States. It was further informed that it was widely believed that the Institute was good for the Caribbean and that Member States were better off with, rather than without, the Institute. At a time that Governments in the Region were talking about value proposition for their investments, the CIMH's increasing importance to the Region was highlighted as a positive return on the investment for the Governments.

3.12 Council noted that the Institute was generating revenue to offset some of its costs. The potential clients of the CIMH were in the areas of insurance, finance, sports, recreation, construction and transport. The Council was informed that the Institute intended to strengthen its fiduciary responsibility, which would allow the CIMH to retain overhead costs that would have otherwise been out-sourced to other entities. This would greatly enhance the Institute's ability to attract new revenue streams.

3.13 It was also informed of some of the new ways of attracting investments undertaken by the CIMH; one such possibility was through the Caribbean Development Bank (CDB) Strategic Framework (2015-2019). Two areas were identified in which the CIMH and others could attract investment through the promotion of environmental sustainability, noting that within environmental sustainability, there was a climate component and a disaster risk component which could be leveraged. Council noted that CIMH was able to receive funding from the CDB through the alignment of its work programme with the CDB's strategy.

3.14 The Principal informed the Council about access to the Green Climate Fund (GCF), which provided financing to climate action projects in developing countries. CIMH was in the process of preparing a proposal for funding by the GCF through the Simplified Application Process (SAP), which sets a ceiling of USD 10 million for projects.

3.15 Council noted the Institute's continued support of South-South partnerships with the South Pacific and joint scientific research activities with European partners. One area of tourism which should be explored was scientific tourism as the region has stable governments and infrastructure which could attract researchers to the region.

3.16 The Principal informed the Council of the possibility of piloting a summer school in St Kitts and Nevis based on the response of school children to the presentations on meteorology and hydrology delivered by a CIMH Intern to various schools.

3.17 **The Council:**

Noted the Principal's Report

Commended the Principal on the projects that the Institute was bringing to the Region.

3(c) CIMH Board of Governors' Report

3.18 The Chairman of the CIMH Board of Governors presented to the Council, the following decisions that were made at the 55th meeting of the Board, which took place on 12-13 November 2018.

1. With reference to *Doc 3.2 - Report of the Appointments and General Purposes Committees*: The Board recognized the improvements in campus security from the installation of a camera network, but **recommended** that the CIMH revisits fencing the property to further improve campus security.
2. With reference to *Doc 4.1 - BWU/CIMH Matters*: - The Board **agreed** with the proposal of the Principal, that the Secretary to the Board, under the guidance of the Chairman and the Principal, should prepare a correspondence to the Barbados Workers' Union, explaining that the positions outlined in their correspondence (ref: TM/ka/555) ran counter to the agreements governing funding at CIMH and were therefore not actionable. The correspondence should further note that the CIMH was prepared to meet with the BWU to discuss this matter once the letter was redrafted, as well as to discuss other existing matters.
3. With reference to *Doc 4.3 - Finances of the Institute*: - The Board **recommended** that Member States seek to remain current with their subventions while making every attempt to reduce their arrears. Members further urged the Principal to visit Member States to meet with local authorities to discuss the value of the Institute to local weather and climate resilience in an effort to encourage Members to pay their subventions while reducing their arrears.
4. With reference to *Doc 4.4 - Review of Previous Decisions*: - The Board **agreed** that a sub-committee comprised of the Principal, the Representative from Jamaica and a former Director of a NMHS, would review the document to ascertain the status of previous decisions, and have the document returned to the Board of Governors in 2019.

5. With reference to *Doc 4.7 - Staffing Matters*: - The Board **approved** the CIMH strengthening its fiduciary capacity to manage and implement development programmes, in an effort to maximize returns associated with such activities. As part of the approval, the Board agreed that the CIMH could hire under contract, and as recommended in the report on the strengthening of the Institute's management and administrative processes, a Finance Manager, a Procurement Officer and a Human Resources Manager, to complement the existing administrative team at the Institute. The Board further approved a pilot programme to fund the new positions through a combination of four approaches (i) utilization of the arrears payments (ii) utilization of rainy-day funds (iii) utilization of funds generated and (iv) a combination of the three points above. The Principal agreed to prepare a detailed report to the Board on the final strategy for funding the three positions along with some indication of the number of projects needed to sustain the positions.

3.19 **The Council:**

Noted the decisions and recommendations emanating from the BoG-LV meeting.

4. **STATUS OF ACTIONS FROM THE PREVIOUS SESSION**

4.1 Following every session of the Council, the CMO Headquarters produces a single document containing an **Action Sheet** that allows the Council to follow-up on the actions taken on the decisions of its previous session, and to discuss any further actions if required. A summary of the decisions of CMC57 (Antigua, 2017) was presented to Council, giving the status of actions taken to implement these decisions of Council, and indicating areas where action as proposed had not materialized.

4.2 Council discussed the need to review and complete any outstanding implementation matters re the ICAO-mandated *Quality Management System (QMS)*, including competency and qualification requirements, noting ICAO deadlines in *CMC57 Agenda item 5 (f) Aeronautical Meteorological Services*. Council was reminded that the ICAO-preferred QMS system was based on the International Standards Organization (ISO) 9001 standard, which was revised in 2015 and that the new 9001:2015 came into effect in September 2018.

4.3 Council was also reminded that there was the outstanding matter of having the Eastern Caribbean Civil Aviation Authority (ECCAA) perform the audit of the meteorological service providers within the Eastern Caribbean countries under safety oversight as per their legal mandate. Council was informed that the CMO Headquarters wrote to ECCAA during 2018 as directed, but there had been no response or acknowledgement of the correspondence. The Council issued a statement in respect the responsibility of ECCAA concerning its mandate, which is in **ANNEX III**.

4.4 Under *CMC57 Agenda Item 11, CMO Weather Radar Network*, Council had been urging the wide publicity of regional radars and related composites on websites and through the media, as well as a formal long-term commitment to the operations of the regional radar composite. Significant work was still required in this regard. The formation of *CMO Operational Radar Working Group* was again postponed by the CMO Headquarters because two of the radars remained out of service for significant periods. In addition, the level of contributions to the Headquarters budget in 2018 did not permit this new activity to be undertaken as planned. The CMO HQ has been working on the terms of reference for the Working Group which, after an initial meeting, it was envisioned online tools would be used primarily for meetings, sharing of expertise, troubleshooting, and other collaboration.

4.5 Council was reminded of the discussions, under CMC57 Agenda item 12(b), the concept of a *CMO Lightning Detection Network* (CLDN) was endorsed by Council. The request by Council for an evaluation of the *Geostationary Lightning Mapper* available on the new GOES satellites (GLM) prior to its actual decision on the CLDN could not yet be undertaken as there was insufficient data available for a proper study. The GOES-East GLM data only became operational in March 2017. The evaluation would be undertaken when a large enough database becomes available.

4.6 The Council

Noted the Status of Actions from CMC57;

Requested the Headquarters Unit to send the resolution to the ECCAA on its behalf.

5. SPECIAL CMO AND WMO ISSUES

5.1 The Coordinating Director briefed the Council on the following special CMO and WMO-related issues in connection with the following topics:

- (a) Outcome/Highlights of the 2018 Executive Council (EC) of the World Meteorological Organization
- (b) WMO Integrated Global Observing System – Pre-Operational Phase
- (c) Reception of new Geostationary Satellite Imagery in CMO Member States
- (d) The Global Framework for Climate Services (GFCS)
- (e) Issues emerging from the WMO Technical Commission sessions in 2018 (CCI, CAgM, CAeM)
- (f) Tropical Cyclone Programme
- (g) The World Meteorological Congress 2019.

(a) **Outcome/Highlights of the 2018 Executive Council (EC) of the World Meteorological Organization**

5.2 The 70th session of the WMO Executive Council was held at the Headquarters of the World Meteorological Organization in Geneva from 20 to 29 June 2018. It was chaired by the President of WMO, *Mr David Grimes* of Canada. The Executive Council (EC) is the executive body of the Organization, which meets annually, implements decisions of the supreme body – the WMO Congress – coordinates the Programmes, decides on the allocation of budgetary resources, provides guidance and takes action on recommendations of Regional Associations and Technical Commissions and on matters affecting international meteorology and related activities. The outgoing Coordinating Director of the CMO, *Mr Tyrone Sutherland*, had been a member of the WMO Executive Council for 19 years, having been first elected in 1999 and then serving as the Second Vice-President of the WMO for the maximum two terms between 2003 and 2011. The Coordinating Director was accompanied to this session by *Dr. Arlene Laing*, the Coordinating Director-Designate of the CMO, along with advisers comprising the Principal of the CIMH, *Dr. David Farrell*, and the Science and Technology Officer at the CMO Headquarters, *Mr Glendell De Souza*.

5.3 As noted in paragraph 3.3 above, a special feature of this 70th session for the CMO community was the transition from the retiring Coordinating Director of CMO, in his long-standing position as an elected member of the WMO Executive Council, to a role for the incoming Coordinating Director. The position of Permanent Representative with WMO is a requirement to be eligible for election to the WMO Executive Council. Therefore, at Mr Sutherland's request, the Government of the United Kingdom agreed to the naming of Dr. Arlene Laing as the new Permanent Representative of the British Caribbean Territories (BCT) with WMO with effect from 27 June 2018. That decision therefore enabled Mr Sutherland to participate in the Council's session as a member until 26 June. During an in-camera session of the WMO Executive Council, Dr. Laing was elected as an acting EC member to replace Mr Sutherland from 27 June 2018.

5.4 This 2018 session of the Executive Council continued the implementation process for the seven priorities for the period 2016-2019. Those of particular relevance to the CMO Member States continued to be those listed in paragraph 5.1 above, as discussed in the paragraphs following. Among the many tasks of this 70th session of the Executive Council was the preparation for the next Session of the **World Meteorological Congress** (Cg-18) in 2019. The World Meteorological Congress is the supreme organ of the WMO, which decides on all global activities of the Organization. In this regard, the Executive Council spent considerable time discussing a major topic to be brought to the Congress - the reform of WMO's structure - to meet the rapidly growing need for weather, climate and water services and scientific know-how, in order to enhance the value of WMO activities for its Member States and relevant international organizations. The main part of these reform discussions concerned the number and structure of the WMO Technical Commissions, in which there have been proposals to merge some of the Commissions. The difficult discussions were essentially unresolved and would have to be resolved by the Congress itself.

(b) WMO Integrated Global Observing System – Pre-Operational Phase (2016-2019)

5.5 Over the last several years, the Caribbean Meteorological Council held significant discussions on the *WMO Integrated Global Observing System* (WIGOS), an all-encompassing approach to the improvement and evolution of WMO's global observing systems needed in all countries, along with the *WMO Information System* (WIS). Both WIGOS and WIS are very essential to all technical and scientific activities of Meteorological Services in the Caribbean and worldwide.

5.6 Council recalled that WIGOS moved into its *Pre-operational Phase* in 2016 and was set to become fully operational from 2020. As with all Member States of WMO, CMO Member States should currently be in full preparation for implementation activities at the regional and national levels. The goal therefore was to have all Member States and their partners benefit from a fully operational system from 2020. In the Caribbean region, the focus has been on getting the Meteorological and Hydrometeorological Services fully ready in the first instance, while efforts continue to bring partner institutions and organizations on board as contributors to WIGOS.

5.7 WMO had been developing the concept for *Regional WIGOS Centres* (RWCs), recognizing the critical role that RWCs would have in advancing the implementation of WIGOS at the regional level by providing regional coordination, technical guidance, assistance and advice to Members and partner organizations, essentially through regional WIGOS performance monitoring and incident management. The CMO Headquarters and the Meteorological Service of Trinidad and Tobago indicated to the WMO Secretariat that they would investigate the possibility of collaborating as a joint RWC for the English-speaking Caribbean. The Caribbean Meteorological Council discussed this concept to determine whether it was a feasible approach.

(c) Reception of new Geostationary Satellite Imagery in CMO Member States

5.8 Council recalled its discussion at its previous session on the reception by the Meteorological and Hydrometeorological Services in Member States of imagery and other data from the new Geostationary Operational Environmental Satellites (GOES). It noted that the **GOES-East** weather satellite was positioned at 75.2 degrees West, providing coverage over the Atlantic Ocean from the west coast of Africa, westward to North and South America and the Caribbean. The sister satellite, successfully launched in March 2017, was scheduled to become operational as the **GOES-West** satellite at 137°W in late 2018.

5.9 Council looked at the various direct and indirect methods of receiving the vast volume of data from the satellites and commended the Cayman Islands, which had installed a full GOES ReBroadcast (GRB) ground station, the first such system in the Caribbean, for its willingness to share its GOES data with the NMHSs of other CMO Members without a similar receiving capability. Council noted that the CMO Headquarters had initiated discussions with regional and international network experts on optimal methods for transferring the data from the Cayman Islands National Weather Service to the Trinidad and Tobago Meteorological Service.

(d) The Global Framework for Climate Services (GFCS)

5.10 The Council was reminded that the **Global Framework for Climate Services** (GFCS), a UN-led initiative spearheaded by WMO, was being implemented throughout the world to guide the development and application of science-based climate information and services in support of decision-making. The governing structure for the GFCS was an *Intergovernmental Board on Climate Services* (IBCS) accountable to the WMO Congress with its Management Committee determined by the various WMO Regional Associations. Membership for North America, Central America and the Caribbean (WMO Region IV) was through the British Caribbean Territories (BCT), Canada, Costa Rica and the USA. *Dr. David Farrell* was the BCT/CMO representative on the Management Committee with *Mr Adrian Trotman* as the alternate.

5.11 Council recalled that several of the GFCS Projects involve or would involve the Caribbean Institute for Meteorology and Hydrology. For example, the "*Programme for Implementing the Global Framework for Climate Services (GFCS) at Regional and National Scales*" was being funded by a grant from Canada to implement GFCS in the Pacific, the Caribbean, South Asia and the Arctic. The CMO Member States benefitting from this project were Antigua and Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines and Trinidad and Tobago. Council noted that in 2018, the WMO Executive Council endorsed a Mid-term Review of the GFCS undertaken by its Management Committee. This would be submitted to the 18th World Meteorological Organization Congress (Cg-18) in 2019 for its full review and recommendations.

(e) Issues emerging from WMO Technical Commission sessions in 2018 (CCI, CAgM, CAeM)

5.12 Council noted that the **WMO Commission for Climatology** (CCI) was the WMO Commission that guides the global activities of the *World Climate Programme*. Council also noted that the Commission also played a key role in implementation of the *Global Framework for Climate Services* (GFCS) (see section (d) above). The 17th session of the Commission was held at the WMO Headquarters in Geneva, Switzerland from 10-13 April 2018. CMO Member States that participated in CCI were Belize, Trinidad and Tobago and the British Caribbean Territories/CMO. Among the many resolutions passed by the Commission was one on enhancing the operations of the network of WMO

Regional Climate Centres (RCC). Council recalled that the CIMH was officially designated as a WMO RCC for the Caribbean in 2017.

5.13 Council was pleased to note the involvement in CCI of experts from CMO Member States and institutions. It noted that the CCI Management Group was expanded to include *Mr Carlos Fuller* of Belize as Special Advisor to the Commission's President on *High-level Science-Policy Climate Related Issues*. It also named *Mr Adrian Trotman*, *Dr. Cédric Van Meerbeeck* of the CIMH and *Dr. Tannecia Stephenson* of Jamaica as members of various Expert Teams of the Commission.

5.14 Council was informed that the 17th session of the **WMO Commission for Agricultural Meteorology (CAgM)** was held in the Republic of Korea in April 2018, providing guidance to WMO Member States in the field of agricultural meteorology, by studying and reviewing the available science and technology to help develop sustainable and economically viable agricultural systems and in the use of climate information for long-term agricultural planning purposes.

5.15 The Commission session was preceded by a "*Women's Agro-Meteorology Leadership Workshop*" and a Technical Conference (TECO) on "*Future Challenges and Opportunities in Agricultural Meteorology*". The Women's Workshop was aimed at building a cohort of female leaders in the agrometeorological community, who would contribute to the scientific work of CAgM. Three female staffers from CMO Member States participated in the Workshop before being joined by one male for the CAgM session.

5.16 The 16th session of its **Commission for Aeronautical Meteorology (CAeM-16)** took place in the United Kingdom in July 2018. CAeM is the WMO Commission that guides its Aeronautical Meteorology Programme, recognizing that aeronautical meteorology was vital for the efficiency, safety and environmental sustainability of civil aviation and a major or even prime focus for many Meteorological and Hydrometeorological Services around the world, including the Caribbean.

5.17 Council has always recognized that the involvement of the organs of the CMO in this area was fundamental to the region. In this regard, *Mr Glendell De Souza* of the CMO Headquarters and *Ms Kathy-Ann Caesar* of the CIMH participated in the Commission's session, which was preceded by a Technical Conference (TECO) on 23 July 2018 on the theme "*The Future is now: Meteorology Enabling Decision Support*".

5.18 Several issues that faced National Meteorological Services in the provision of aeronautical meteorology, which had been considered by the Commission, were also addressed by Council. These issues were being driven by the *International Civil Aviation Organization (ICAO)*'s requirements and included, among others, the maintenance and updating of *Quality Management Systems (QMS)* by Meteorological Services, including important competency assessment frameworks for Aeronautical Meteorological Personnel (AMP). As an important regional input in this regard, *Ms Kathy-Ann Caesar*, who had been a core member of the *CAeM Expert Team - Education, Training and Competency* since 2014, was selected as the co-chair of the Expert Team at the session.

(f) Tropical Cyclone Programme (TCP)

5.19 Council was reminded that activities within the WMO *Tropical Cyclone Programme (TCP)* remained among the most important WMO programmes to the Caribbean and other tropical basins. The TCP was essential to help reduce the disaster risk associated with the tropical cyclones. The most critical regional activity under the TCP was the WMO *Hurricane Committee*, serving the *North Atlantic and Caribbean Basin*. The Hurricane Committee had at its core, *the US National Hurricane Center*, which remained one of WMO's primary *Regional Specialized Meteorological Centres (RSMCs)* for tropical cyclones.

5.20 Council was aware that most Meteorological Services in CMO Member States were represented on the Hurricane Committee which, along with the relevant regional and national disaster management community, work continuously towards the reduction of disaster risks by tropical cyclones, particularly in terms of loss of lives. Council noted that the regional warning system included back-up arrangements between Meteorological Services with warning responsibilities.

(g) The World Meteorological Congress 2019

5.21 Council was reminded that every four years, the *World Meteorological Congress*, which is the highest body of the WMO, meets to review its Programmes and activities for the next Financial Period. The Programmes of the WMO affect all nations of the world - large and small. All of the sections above would be among the major issues to be brought to the 18th *World Meteorological Congress* session, to be held in Geneva, Switzerland from 3-14 June 2019. As occurs at every session preceding a WMO Congress, the Caribbean Meteorological Council reviewed and developed its positions on existing and emerging issues in preparation for the Congress.

5.22 A particularly contentious issue at the Congress, as noted in Section 5(a) above, was expected to be proposals on reforms to the WMO Technical Commissions. It was felt that the same could be true about proposals for reforms to the structure and number of Regional Associations. Closely tied to the Congress decisions on structural reforms would be the *WMO Strategic Plan and Budget* for the period 2020-2023 and the Secretary-General's budget proposals for that same period.

5.23 A very critical activity of every Congress would be the election and appointments of the Officers of the Organization. The 18th Congress will elect the President and three Vice-Presidents, along with 27 other members of the Executive Council. The Congress will then appoint or re-appoint the Secretary-General of the Organization. It was useful to note that the current President of WMO, *Mr David Grimes* of Canada, would complete his full period of two consecutive terms at this Congress, having been elected in 2009 and re-elected in 2015. He has served the Organization with great distinction as President. Therefore, a new President would be elected at this Congress.

5.24 As noted in section 3(a) above, Council discussed the intention of the region to seek the election at the Congress to the WMO Executive Council of the incoming Coordinating Director of CMO, as the Permanent Representative of the British Caribbean Territories with WMO. This position was considered to be very critical to all CMO Member States, as well as to the entire North America, Central America and the Caribbean Region of WMO (Region IV).

5.25 The **Council**:

- (i) **Noted and discussed** the key issues emanating from the 2018 session of the Executive Council (EC) of the **World Meteorological Organization**;
- (ii) **Urged** CMO Member States to ensure that their NMHSs complete activities in preparation for the Operational Phase of WIGOS starting in 2020;
- (iii) **Agreed** that the proposed concept of establishing a joint *Regional WIGOS Centres* (RWC) for the English-speaking Caribbean involving collaboration between the CMO Headquarters and the Meteorological Service of Trinidad and Tobago should be explored with authorities in Trinidad and Tobago and the WMO Secretariat, then brought back to Council for its further consideration;
- (iv) **Urged** Member States to **complete the process** for reception of the new GOES-16 weather satellite data and products;

- (v) **Continued** its strong support for the *Global Framework for Climate Services* and to urge Member States to actively participate in GFCS projects and activities;
- (vi) **Noted** the important issues emerging from the 2018 sessions of WMO Technical Commissions on Climate, Agricultural and Aeronautical Meteorology;
- (vii) **Urged** ;
- (viii) **Noted** and **supported** the important work of the regional Hurricane Committee;
- (ix) **Urged** Member States to actively participate in the 18th World Meteorological Congress in 2019.

6. **FINANCIAL REPORT**

6 (a) **Status of Refundable Balance**

6.1 Council was reminded that the annual contribution to the WMO due from the British Caribbean Territories (BCT) was paid by the CMO Headquarters on behalf of the British Government. This contribution was included in the annual budget of the CMO Headquarters and in turn, in the individual CMO Member State's contribution to the CMO Headquarters. Under a long-standing arrangement, a percentage (73%) of this amount was refunded to the CMO by the UK Department of Transport upon submission of an invoice with the accompanying annual audited Financial Statements of the CMO Headquarters. Therefore, this amount was refunded to the Member States that are also Member States and Territories of the WMO.

6.2 By Members' consent, these funds are held by the CMO Headquarters Unit to assist Members in attending important Meteorological/Hydro-meteorological Meetings, participating in training opportunities and purchasing spares. During 2018, a few Member States accessed these funds very effectively in pursuit of these objectives. However, drawdown was linked to their financial status to the Organization. In keeping with a decision made during the 47th session of the Council (2007), each session of the Council was provided with the actual amount of refundable balance that each Member State was entitled to and the amount available for drawdown.

6.3 The status of the Refundable Balances and the funds available for drawdown held at the CMO Headquarters on behalf of CMO Member States as at 30 September 2018 are shown in the table:

	BALANCE (TTD)	BALANCE (USD*)	AVAILABLE FOR USE (USD*)
BRITISH CARIBBEAN TERRITORIES			
Anguilla	105,904	15,576	15,576
BVI	88,625	13,034	13,034
Cayman Islands	287,620	42,301	42,301
Montserrat	50,568	7,437	7,437
Turks and Caicos Islands	179,575	26,411	26,411
	712,292	104,759	104,759
CMO MEMBERS OF WMO			
Antigua and Barbuda	13,894	2,043	-
Barbados	30,183	4,439	4,439
Belize	21,985	3,233	3,233
Dominica	17,650	2,596	-
Guyana	10,581	1,556	1,556
Jamaica	197,383	29,030	5,000
Saint Lucia	11,287	1,660	1,660
St.Kitts and Nevis	84	12	12
Trinidad and Tobago	-	-	-
	303,047	44,569	15,900
TOTAL	1,015,338	149,328	120,659

* USD equivalent calculated at rate of exchange at September 30th, 2018

6.4 The 57th session of Council (Antigua and Barbuda, 2017) approved a new basis for apportioning the amount refunded by the UK Department of Trade which became effective from 2018. The impact of this change on individual Member States entitled to share in the refund due for 2017 is shown in the table below:

MEMBER STATE	OLD METHOD	NEW METHOD	CHANGE
Antigua	3,684	4,771	1,087
Anguilla	19,988	17,737	(2,251)
Barbados	10,317	13,359	3,042
Belize	6,338	8,206	1,868
British Virgin Islands	19,988	17,737	(2,251)
Cayman Islands	142,020	128,513	(13,507)
Dominica	1,474	1,908	434
Guyana	7,664	9,924	2,260
Jamaica	20,045	25,955	5,910
Montserrat	19,988	17,737	(2,251)
Saint Lucia	3,684	4,771	1,087
Trinidad and Tobago	23,141	29,964	6,823
Turks and Caicos Islands	19,988	17,737	(2,251)
Refund Due for 2017 (TTD)	298,319	298,319	-

Comparison of balances to be refunded for 2017.

6.5 The Council

Noted the status of the Refundable Balances Account, as well as the new basis to be used for apportionment of reimbursements which became effective from 2018.

6 (b) CMO HQ - Auditor's Report

6.6 The financial statements of the CMO Headquarters Unit for 2017 were audited by the Auditor General's Department of the Ministry of Finance during May 2018. The audited financial statements for 2016 were presented to Council by the Finance and Administrative Officer.

6.7 **The Council**

- (i) **Reviewed** and **accepted** the audited Statement of Accounts for 2017, noting with pleasure that the CMO Headquarters received an unqualified audit report;
- (ii) **Reaffirmed** the continued use of the Department of the Auditor General of Trinidad and Tobago for the provision of audit services for the Headquarters of the CMO, as provided by the Government of the Republic of Trinidad and Tobago.

6(c) Statement of Contributions and Arrears (CMO HQ & CIMH)

6.8 Each year, the Coordinating Director of the CMO and the Principal of the CIMH are challenged to hold the operating budgets of their institutions to a minimum with the hope that all Member States would meet their annual contributions towards these budgets in a timely manner.

6.9 The Council has repeatedly urged Member States to make regular payments toward the current approved budget and to establish a plan to liquidate arrears in a phased manner. Notwithstanding these pleas, CMO HQ and CIMH continues to experience delays in remittances, part payment and in some cases, non-payment of current contributions by some Member States, which makes it difficult to address the liquidation of long-outstanding balances.

6.10 There has been a persistent shortfall of contributions remitted to the CMO Headquarters and CIMH, which averages 25% and 30% of the approved annual budget respectively. The implications arising from delays and non-payment of contributions may soon begin to impact the operations of the Headquarters Unit, since monies held by the CMO for Member States which operate Rawinsonde and radar stations, as well as the Refundable Balances, have been classified as "*restricted cash*" in the Statement of Financial Position at the end of 2017 and are therefore not available to the Headquarters for use in operations. In light of the delays in receipt of remittances and the consequent shortfall in annual contributions, it is imperative that arrangements be put in place to ensure the availability of funds to meet operating expenses of the Headquarters on a timely basis in the absence of overdraft facilities with the banks to meet any temporary deficit in cash flow.

6.11 The Auditor General of Trinidad and Tobago has continued to raise concerns over the state of arrears in the Report on the Financial Statements of the CMO Headquarters Unit, and as seen in CMC58 Doc 6(b).

6.12 **The Council**

- (i) **Examined** the **Statement of Contributions and Arrears** to the CMO Headquarters and the CIMH at 30 September 2018; and
- (ii) **Called** on all Member States to make every effort to pay their full contribution for the current year, while setting up an internal mechanism to pay off arrears.

7. CMO STRATEGIC PLAN

7.1 Council recalled the fact that, at its 54th session (Jamaica, November 2014), it requested the CMO Headquarters to develop a regional strategic plan for the meteorological community that would be linked to the Caribbean Community Strategic Implementation Plan. The CMO Headquarters developed and presented to Council its “**Operational Programme 2015-2019 - For the Enhancement of Meteorological and Hydrometeorological Services in CMO Member States**”. This plan was linked to the Caribbean Community Five-Year Strategic Plan for 2015-2019 “Repositioning CARICOM”. As noted under item 3 of this Report, CMO Headquarters would be required to report to the CARICOM Secretariat on its deliverables for 2015-2018 and its 2019 Work Plan.

7.2 Council examined and discussed the first iteration of the draft revision of the CMO Strategic Plan for the period 2020-2023, as prepared by the CMO Headquarters. The draft Plan, which follows the CARICOM Results-based Management System, is produced in the **ANNEX IV** to this document. It was noted that national, regional, and international development goals and policy were considered in developing the Plan. In the discussion, it was recommended that broader range regional strategic goals be considered, to ensure alignment with the goals of potential sponsoring organizations. It was also noted that baselines for outcome indicators would need to be established. The intention of the CMO Headquarters was that, after collaboration with the CIMH and CMO Member States, the next edition of the CMO Strategic and Operational Plan 2020-2023 would be brought to Council in 2019 for its approval.

7.3 **The Council:**

- (i) **Discussed** the draft of the CMO *Strategic Plan 2020-2023*, shown in the **ANNEX IV**;
- (ii) **Agreed** that Members and the CIMH must review the Draft Strategic Plan and provide their input, in writing, no later than 28 June 2019.

8. CMO BUDGETS (Headquarters Unit, CRN and Radar, CIMH)

8 (a) CMO HQ Budget Estimates for 2019

8.1 Budget estimates of the operating costs for the CMO Headquarters Unit and contributions to the Caribbean Rawinsonde and Radar Networks for 2019 were presented to the Council.

8.2 In the presentation of the CMO Headquarters Budget Estimates for 2019, it was noted that although Trinidad and Tobago, the home of the CMO Headquarters Unit, continued to experience pressure on its foreign exchange reserves, the anticipated decline in the value of the local currency had not been reflected in the official exchange rates at the banks. Therefore, the budget estimates proposed for 2019 provided for no change in the exchange rate for USD, which remains at TTD 7.00 to USD 1.00. However, the rate of exchange used for the East Caribbean dollar (XCD) is TTD 2.67 to XCD 1.00, which is 2.9% lower than the TTD 2.75 to XCD 1:00 used for the approved budget for 2018.

8.3 The total budget proposed for 2019 is 14.3% lower than the approved budget for 2018, since the 2018 budget provided for significant one-time costs associated with the "changing of the guard". In order to provide a more realistic comparison between the proposed estimates for 2019 and the approved budget for 2018, the one-time costs included for 2018 have been isolated in order to focus on the routine annual operating costs to the Organization. This comparison of the estimates for 2019

versus the routine operating budget approved for 2018 actually highlights an increase of 2.15% for 2019.

8.4 In February 2017, the lease on the premises currently occupied by the CMO Headquarters expired and, up to the time of this Council session, a new agreement had not been reached between the Landlord and the authorities representing the host country. In light of on-going negotiations between the authorities and the Landlord towards a new lease, the CMO Headquarters refrained from making any commitment to meeting this unbudgeted expense.

8.5 Council recalled that, at its 54th session (Jamaica 2014), the issue pertaining to the remuneration of some officers at the CMO Headquarters was discussed. This matter arose due to the incorrect interpretation and application of the tax exemption status of these officers, according to the privileges and immunities provided. At that time, the Chairman of the Council made an intercessional decision in October of that year regarding the equality of treatment to all staff of the CMO Headquarters and the refund of taxes to affected staff in response to the Auditor General's Management Letter.

8.6 Council recalled that at its 56th session (Grenada 2016), approval was granted for the cost of repatriation and other end-of-contract costs pertaining to the retirement of the incumbent Coordinating Director to be spread over two years, so as to minimise the impact on Member States in 2018. While these costs were accrued in 2016 and 2017, the discharge of this liability would impact on the Organization's cash outflow in November 2018. The budget for 2019 is presented in **ANNEX V**.

8.7 **The Council:**

- (i) **Approved** the budget of **XXX X,XXX,XXX.XX**, equivalent to **USD XXX,XXX.XX**, as detailed in **ANNEX V**, with Member contributions as indicated in **ANNEX VI**;
- (ii) **Approved** temporary drawdowns from the restricted cash balances held for Member States operating the Caribbean Rawinsonde and Radar Networks, should the need arise in 2019;
- (iii) **Approved** the implementation of intercessional decisions taken in October 2014 to ensure that all officers of the Headquarters Unit are exempted from any form of direct taxation on salaries, remuneration and allowances paid by the Organization, in accordance with the Host Country Agreement;
- (iv) **Urged** Members to give priority to meeting annual contributions, as well as liquidating any arrears of contribution due to the Organization;
- (v) **Also Urged** Members to inform the CMO Headquarters of their transfer of funds, including the amount and date, in order to address difficulties in properly identifying the origin of funds within the banking system.

8 (b) **CIMH Budget Estimates for 2019**

8.8 The Chairman of the Board of Governors informed the Council that the CIMH presented the Estimates of Expenditure for the financial year 2019 to the Board of Governors for its consideration. The Board approved the Estimates of Expenditure of BBD 7,707,888 or USD 3,866,025.79, an increase of 5.0 percent.

8.9 **The Council** held further deliberations on the proposal from the Board and:

- (i) **Approved** the Estimates of Expenditure for 2019 of **BBD X,XX,XXX.XX** or **USD X,XXX,XXX.XX** for the CIMH, as presented by the Board of Governors. Member States' contributions based on that figure are indicated in **ANNEX VI**.

9. ANNUAL MEETING OF THE DIRECTORS OF METEOROLOGICAL SERVICES

9.1 The Caribbean Meteorological Council considered the Report of the 2018 Annual Meeting of Directors of Meteorological Services, held on 14 November 2018, as presented by Mr Glendell De Souza, Science and Technology Officer of the CMO Headquarters. The Report provided the Council with the following summary of the deliberations and recommendations of the Directors on a wide range of technical and scientific topics, which would have an impact on future costs, policy decisions, training opportunities and service delivery. The following three items were drawn to the attention of Council:

1. Status of Actions from the Previous Meeting.

Meteorological Services of Member States were supposed to transition to the table-driven code form for their meteorological observational data and forecast information since 2010. However, this task had not been completed. There were two pathways forward for the Meteorological Services to become compliant with the WMO requirement of 2010 and the ICAO requirement for all aviation observations, forecasts and SIGMETs to be encoded in Geographic Markup Language/Extensible Markup Language (GML/XML), which would come into force on November 5, 2020. Funds could be sourced nationally for the purchase of new workstations which have the capability to encode and decode in table-driven code form and GML/XML or human resources could be harnessed within the Member States to modify freely available existing software.

2. **Training**

CIMH had started the conversion of 4-credit courses to 3-credit meteorology courses at the request of the University of the West Indies to align its program with the rest of the UWI programs. This would affect the staffing needs at CIMH and the length of the course of study to achieve a major in meteorology.

3. **CAeM Global Survey**

Under the required ICAO Quality Management Systems (QMS) requirements, aeronautical meteorological service personnel must be both qualified and competent. Therefore, within the required QMS, which must be implemented in all meteorological services which were providing services to international aviation, there must be a regular review of competencies and remedial action provided where necessary. The CIMH had offered to assist Meteorological Services by creating a training database whereby data on courses attended and certification achieved by meteorological personnel of Meteorological Services of Members would reside. Furthermore, Meteorological Services were to submit their training plans for the foreseeable future. This would enable the Services and CIMH to plan continuing professional development training and remedial training.

9.2 **The Council**

- (i) **Reviewed** and **amended** the draft of the DMS2018 Report;
- (ii) **Noted** that human and financial resources would be needed to have National Meteorological Services compliant in encoding and decoding meteorological information in the required code forms;
- (iii) **Noted** the possible financial impact that the changes to 3-credit courses could have on the CIMH and Member States.

10. CMO WEATHER RADAR NETWORK

10.1 Council recalled that the CMO Weather Radar Network comprised of six S-band Doppler radars, namely, the US-made radar in Jamaica, installed in 1999; and five German-made radars in Belize, Barbados, the Cayman Islands, Guyana and Trinidad and Tobago. This network, along with other pre-existing radars in other Caribbean islands, provided the Caribbean with a modern sophisticated tool that complements other surface, upper-air and satellite-based weather observing platforms as part of the regional early weather warning system.

10.2 The radars in the CMO Member States have a significant impact on weather surveillance, forecasts and warnings in the Caribbean. The reliance on the system had been growing within and outside of the region and, under the auspices of the *World Meteorological Organization (WMO)*, plans had been in place to integrate, in stages, the data from these radars with all other radars in the entire Caribbean basin as part of a larger weather surveillance system. For a CMO-wide or the larger Caribbean-wide radar network to properly function, all radar-operating States needed to work steadily to ensure reliability of their individual radar operations.

10.3 Council noted the status of operations of the regional radar network and noted that, continuing on from 2017, 2018 was not the best year in terms of radar availability among CMO Members. The furthest east of the radars, Barbados, which had a major outage in November 2016 that was only resolved briefly in November 2017, again had major issues that took the radar out of operations throughout 2018. Council was informed of the status of the project underway in Jamaica for the replacement of its existing radar, which had been installed in 1999, with a new S-band dual-polarised radar. It was hoped that the project implementation would to be completed in 2020. Council was also informed that the Bahamas was in the process of implementing its own radar project, expected to be completed in 2019, which would cover the entire Archipelago, as well as portions of the Turks and Caicos Islands. It was expected that the Bahamas radar system would be fully operational by mid-2019. Council noted that the initial discussions between the Bahamas and CMO Headquarters suggested that once these radars materialize, consideration would be given to integrating them into the regional composite.

10.4 The session once again discussed the availability of radar on the websites of the National Meteorological Services, including data from the Composite system developed by the Barbados Meteorological Service. Council **urged** Services utilizing the composite to liaise with the Barbados Meteorological Service to facilitate proper access and use. The wider use of weather radar data by the television media was also **encouraged**. Recognizing that the radar composite generated by Barbados had become a primary tool in the region, Council once more **urged authorities in Barbados** to provide formal support for the regional radar composite, so that it would be accepted as an input into the WMO Integrated Global Observing System (WIGOS) and to reconsider its approach to restoring the radar to operational service.

11. OTHER PROJECT UPDATES AND PROPOSALS

11(a) Finland Initiative - Complementary Project to the SIDS Caribbean Project and SHOCS I and II (COPS)

11.1 Council recalled that, between 2001 and 2004, the Government of Finland funded the **SIDS-Caribbean Project** titled "*Preparedness to Climate Variability and Global Change in Small Islands States, Caribbean Region*". This was followed by a project entitled "*Strengthening Hydrometeorological Operations and Services in the Central America and the Caribbean (SHOCS)*".

11.2 Phase I of SHOCS, called SHOCS I, was implemented between 2010 and 2012 with a budget of 0.5 million Euros. A Phase II, called SHOCS-II, was implemented between 2013 and 2015 with a budget of one Million Euros. The Project was implemented by the Finnish Meteorological Institute (FMI) in partnership with the *Association of Caribbean States* (ACS), WMO and CMO. The beneficiaries of the Project were the National Meteorological and Hydrological Services (NMHS) and Disaster Management Agencies in participating countries, along with the CIMH as a regional institution. Towards the end of SHOCS-II, the funding policies of Finland caused restrictions to the participation of Barbados and Trinidad and Tobago, although the CMO Headquarters was able to minimize the impact because of the regional responsibilities of the NMHSs in those States.

11.3 At the conclusion of SHOCS-II, there were residual funds available from the components of SIDS and SHOCS, so that the Project Board identified priorities for capacity building during a continuing phase called the ***Complementary Project to the SIDS - Caribbean Project and SHOCS I and II (COPS)***.

11.4 Council recalled that the COPS Project, with 186,000 Euros available, was implemented from early 2016 and was completed at the end of 2017. The project consisted of several training workshops and also included technical assistance, installation of modern systems and renewal of old equipment. All activities were aimed at contributing to the development of Early Warning Services (EWS) and Disaster Risk Reduction (DRR), thus continuing the work already started in SHOCS. The main activities were:

- **Activity 1:** The implementation of new tools at the weather forecast services to improve the capacity to analyse severe weather conditions (SmartMet);
- **Activity 2:** Development and implementation of solutions for common presentation and communication of early warnings (SmartAlert).

11.5 In the previous projects, forecaster workstations and weather forecast production systems, called SmartMet, built by the Finnish Meteorological Institute (FMI), were installed in some ten countries in the region. The SmartMet system was installed to provide new technical tools and methods to enhance the capacity of NMHSs to contribute to the Caribbean Early Warning System and to enhance service production.

11(b) WMO Severe Weather Forecasting Demonstration Project (SWFDP)

11.6 Council had, for several years, recognized that there would always be areas that could be improved in any weather warning system, particularly for episodes of severe weather that may not always be the result of a tropical cyclone and could occur at any time of year. Council recalled that, in November 2015, it endorsed a proposal by CMO and partners to implement a WMO ***Severe Weather Forecasting Demonstration Project*** (SWFDP) in parts of the Caribbean, with an aim, among others, to foster greater collaboration among National Meteorological Services and Disaster Management Agencies. Since that time, significant strides have been made towards the implementation of the SWFDP.

11.7 The Regional WMO Management structure established a *Regional Subproject Management Team* (RSMT) for the development and implementation of the SWFDP. Mr Keithley Meade of Antigua and Barbuda, Ms Kathy-Ann Caesar of the CIMH and the Coordinating Director of the CMO served as members of the RSMT. The Coordinating Director co-chaired the RSMT with an expert from France. The Coordinating Director Designate has been proposed to the regional WMO Management Group as a replacement co-chair because of her expertise in this area. It was recalled that the WMO Severe Weather Demonstration Project was being developed along the following lines:

- (i) The SWFDP would cover all the islands from Trinidad in the south to Puerto Rico in the North, with special arrangements for Haiti;
- (ii) The Météo-France Centre in Martinique would serve as the *Regional Forecast Support Facility* (RFSF) for the Project;
- (iii) The CIMH would provide technical support for the SWFDP.

11.8 Council recalled that the SWFDP implementation in the Eastern Caribbean was made possible by seed funding from Canada through its CREWS (Climate Risk and Early Warning Systems) Project. The SWFDP was being developed in four phases: 1) Overall Planning; 2) Implementation plan development and execution; 3) Demonstration and 4) Operational (no longer a project).

11.9 Council was informed that, during 2018, the *Regional Subproject Management Team* reviewed its *Regional Sub-Project Implementation Plan* (RSIP) for the SWFDP and examined the progress made at the *Regional Forecast Support Facility* (Météo-France Martinique), including the preparation of the web platform for data/products sharing, to produce severe weather guidance and to ensure real-time coordination. As part of the SWFDP development, a preparatory training workshop was held at the CIMH in March 2018 for the Meteorological Services of participating Member States to develop the capacity of their forecasters in related areas.

11.10 In its deliberation on this matter, it was disclosed to Council that a pre-operational Demonstration (testing) Phase had been planned for the latter part of 2018. However, unexpected changes in technical personnel who had been preparing the web platform for data/products sharing, meant that this testing phase would have to be delayed, possibly into early 2019. The *Regional Subproject Management Team* planned to meet in 2019 with the WMO Secretariat to resolve issues regarding the test-phase, the mid-to-long-term training strategy and plan, research and development needs, observations challenges and other matters.

11.11 Council recalled that the WMO Expert Group on the SWFDP identified the *Caribbean Meteorological Organization* (CMO), through its Headquarters and organs, as the regional entity to support SWFDP in the operational phase.

11(c) Lightning Detection System

11.12 Council recalled that, in the past, the CMO Headquarters indicated its interest in establishing a ground-based Lightning Detection System in the region in partnership with the Meteorological Service of France [Météo-France]. The CMO Headquarters has studied this system in great detail and was of the opinion that such a system was very necessary in the Caribbean. Over the years, the CMO Headquarters reported to the Council, the results of a demonstration period of a long-range lightning detection system that showed its tremendous value to the prediction of severe weather in the region.

11.13 Council noted that, in the various presentations made, it had been shown how ground-based systems use triangulation from sensors at multiple locations to determine location of the lightning flash. Therefore, for this higher resolution to be achieved, it would be necessary to install some

lightning sensors along the island chain to allow for adequate triangulation using the commonly known phenomenon “lightning sferics”.

11.14 Over the years, the CMO Headquarters has received several proposals from a number of lightning-detection suppliers. Council noted that the CMO Headquarters had proposed that it should consider a capital project approach, in which international funding could be sought, in the same way as was done for the CMO Radar Project, through an internationally-tendered process, in which the equipment purchased and installed under such a project would be owned and operated by the CMO for the benefit of all CMO Member States and the region in general.

11.15 Council recalled that, at its 57th session in 2017, it endorsed the concept of a *CMO Lightning Detection Network* (CLDN). However, it was felt that more information was required as to the cost of, and a sustainability model for the system. It was also suggested that before a final decision could be made on CLDN, the *Geostationary Lightning Mapper* (GLM), which had just become available on the new GOES satellites, should be evaluated during 2018 prior to deciding on the CLDN. As was discussed in section 5(c) above, the new GOES-East satellite was launched in November 2016 and became operational in March 2017, while the new GOES-West, which was launched in March 2017, was scheduled to become operational in late 2018. The GOES-East GLM data therefore became operational in February 2018, while GOES-West GLM data became available, in test mode, in May 2018. As indicated in section 5(c), the NMHSs in CMO Member States had not yet all decided upon their systems for reception of information from the new GOES satellites. Therefore, a proper assessment of the GLM data for operational purposes was still some time away and would therefore impact on discussions by Council on the CLDN issues. Council therefore agreed that a proper assessment of the *GOES Lightning Mapper* output should be undertaken in 2019 before the issue could be brought to the Council for a decision.

11.16 **The Council:**

Noted the completion of the Finland-funded Project Complementary Project to the SIDS-Caribbean Project and SHOCS I and II (COPS);

Requested the CMO Headquarters to express its gratitude to Finland and WMO for their support through the SIDS, SHOCS and COPS projects;

Noted the progress made towards the WMO *Severe Weather Forecasting Demonstration Project* (SWFDP) in the Eastern Caribbean and **strongly supported** regional participation in its implementation;

Noted the recent developments in connection with an operational ground-based lightning detection system.

12. **OTHER MATTERS**

12 (a) **Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean**

12.1 A presentation was provided to Council, by WMO and the World Bank, on this 3-year project “Strengthening Hydro-Meteorological and Early Warning Systems in the Caribbean”, which was being financed by the CREWS Initiative for a total amount of US\$ 5.5 million. It is being implemented jointly by the World Meteorological Organization (WMO), the United Nations Office for Disaster Reduction (UNISDR), the Global Facility for Disaster Reduction and Recovery (GFDRR) and the World Bank (WB). Council noted that the Project’s geographic coverage included all the Caribbean Community (CARICOM) Member States, with the objective to strengthen and streamline regional and national systems and capacity related to weather forecasting, hydrological services, multi-hazard impact-based warnings and service delivery for enhanced decision-making. It was reported to Council that implementation of the CREWS project would be closely coordinated with regional partners CIMH and

Caribbean Disaster and Emergency Management Agency (CDEMA), as well as CMO Headquarters Unit, among others.

12 (b) The Caribbean Meteorological Foundation (CMF)

12.2 The Caribbean Meteorological Organization was established by Acts of Parliament in *sixteen Member States of the Commonwealth Caribbean*. The Organs of the CMO, namely:

- (i) the Caribbean Meteorological Council;
- (ii) the Headquarters Unit;
- (iii) the Caribbean Meteorological Institute;
- (iv) the Caribbean Meteorological Foundation.

12.3 The purpose of the Foundation when it was established, was to raise funds for the promotion, through the Institute, of the study and research of meteorology and allied sciences. The Caribbean Meteorological Foundation (CMF) remains outstanding for its lack of implementation as a functioning organ of the CMO.

12.4 The Council discussed the purpose and function of the Caribbean Meteorological Foundation; however, it was noted that further review on this matter was needed before Council could provide a policy on the way forward.

12 (c) Human Resources Committee

12.5 The CMO Human Resource (HR) Committee which was reformed at CMC57 (Antigua, 2017) to comprise *Mrs Corsel Robertson* (Chair), *Mr Andrew Gittens* of Barbados and *Mr John Smith* of the Turks and Caicos Islands, was tasked with the mandate to resolve the outstanding matters associated in relation to the CIMH Principal's terms of employment. The Committee was unable to meet during 2018 and the matter was still outstanding.

12.6 To resolve the matter the Chairman invited Mr Denzil Jones, a former Chair of the Committee to meet with Council and resolve the matter expeditiously before the closure of the session. The meeting was suspended and a sub-committee, which comprised of the Chairman, the Coordinating Director, the Coordinating Director-Designate, Chair of the HR Committee, Chair of the CIMH Board of Governors, and Mr Jones, met with the Principal. After deliberations the sub-committee presented the following recommendations and decisions to Council on specific items of concern.

- Requests the delivery of information about the scale of salary for Dean and Deputy Principal of UWI Cave Hill. CIMH will provide this information to the Chair of the Board of Governors of CIMH.
- Approves the provision of a telecommunication allowance for the Principal of the CIMH
- Approves the provision of a research and development allowance for the Principal of CIMH
- Establishes a start date for the provision of the telecommunications allowance and the research and development allowance
- Approves the addition of Permanent Secretary, Ministry of Agriculture and Food Security, Barbados, Mr Seibert Frederick, to the HR Committee. He would immediately commence serving as the Chair of the HR Committee. Mrs Corsel Robertson would continue on the committee along with Mr John Smith of Turks and Caicos Islands Airport Authority.

12.7 **The Council**

Noted and **appreciated** the aims of the CREWS Project;

Welcomed the participation of NMHS of Member States in developing the baseline for the project;

Requested that Members review the purpose of the Foundation for discussion at a later session,

Requested the delivery of information about the scale of salary for Dean and Deputy Principal of UWI Cave Hill to the Chair of the Board of Governors of CIMH,

Approved the provision of a telecommunication allowance of (BDS1000)-monthly for the Principal of CIMH, start date to be determined

Approved the provision of a research and development allowance of (USD2500)–annually for the Principal of CIMH, start date to be determined

Approved the addition of the Chairman of the CIMH Board of Governors to the HR Committee and his ascension to the Chair of the HR Committee.

13. **DATE AND VENUE OF CMC59 (2019)**

13.1 Council invited Member States to indicate their willingness to host the next session, CMC59, in 2019. Council also encouraged Member States to also give consideration to CMC60 in 2020. The Coordinating Director indicated that the CMO Headquarters would contact various Member States in the near future with the hope that a host for CMC59 could be identified.

Close of Meeting

13.2 There being no other business, the Meeting ended with oral tributes to the retiring Coordinating Director, followed by an exchange of courtesies.

AGENDA

1. OPENING OF SESSION AND ELECTION OF CHAIRMAN
2. ADOPTION OF AGENDA AND PROCEDURAL MATTERS
3. CMO EXECUTIVE REPORTS
 - (a) Coordinating Director's Report
 - (b) CIMH Principal's Report
 - (c) CIMH Board of Governors' Report
4. STATUS OF ACTIONS FROM PREVIOUS SESSION
5. SPECIAL CMO AND WMO ISSUES
 - (h) Outcome/Highlights of the 2018 Executive Council (EC) of the World Meteorological Organization
 - (i) WMO Integrated Global Observing System – Pre-Operational Phase
 - (j) Reception of new Geostationary Satellite Imagery in CMO Member States
 - (k) The Global Framework for Climate Services (GFCS)
 - (l) Issues emerging from the WMO Technical Commission sessions in 2018 (CCI, CAgM, CAeM)
 - (m) Tropical Cyclone Programme
6. FINANCIAL REPORTS
 - (a) Status of Refundable Balances
 - (b) CMO HQ - Auditor's Report
 - (c) Statement of Contributions and Arrears (CMO HQ & CIMH)
7. THE CMO STRATEGIC PLAN
8. CMO BUDGETS (Headquarters Unit, CRN and Radar, CIMH)
 - (a) CMOHQ Budget Estimates for 2019
 - (b) CIMH Budget Estimates for 2019
9. ANNUAL MEETING OF THE DIRECTORS OF METEOROLOGICAL SERVICES
10. CMO WEATHER RADAR NETWORK
 - Status and operations of CMO Radar Network Operations
 - Establishment of the CMO Radar Working Group

11. OTHER PROJECT UPDATES AND PROPOSALS
 - (a) Finland Initiative - Complementary Project to the SIDS Caribbean Project and SHOCS I and II (COPS) - Project Completion
 - (b) Severe Weather Forecast Demonstration Project (SWFDP)
 - (c) Lightning Detection System
 12. OTHER MATTERS
 13. DATE AND VENUE OF CMC59 (2019)
-

ANNUAL MEETING OF THE CARIBBEAN METEOROLOGICAL COUNCIL

ST. KITTS AND NEVIS

15TH – 16TH NOVEMBER 2018

LIST OF DELEGATES

ANGUILLA

Ms Roshima Roberts - Air Traffic Services Manager
Anguilla Air and Sea Ports Authority
Clayton J. Lloyd International Airport
Wallblake Estate
The Valley
Anguilla
Tel: 1 264 584 9974
Fax: 1 264 497 8345
E-mail: **roshima.roberts<at>gov.ai**

ANTIGUA AND BARBUDA

Mr Edson Joseph - Permanent Secretary
Ministry of Public Utilities, Civil Aviation, Energy and
Transportation
Utility Drive, Cassada Gardens
St John's, Antigua
Tel: 1 268 468 8506
Mobile: 1 268 464 7508
Fax: 1 268 468 8518
E-mail: **jedson84<at>gmail.com**

Mr Keithley Meade - Director of Meteorology
Antigua and Barbuda Meteorological Services
Ministry of Public Utilities, Civil Aviation, Energy and
Transportation
c/o PO Box 1051
V C Bird International Airport, Coolidge
St. George's
Antigua and Barbuda
Tel: 1 268 462 3229
Mobile: 1 268 764 2139
Fax: 1 268 462 4606
E-mail: **metoffice<at>ab.gov.ag**
keithleym<at>yahoo.com

BARBADOS

- Mr Seibert Frederick - Permanent Secretary
Ministry of Agriculture and Food Security
Government of Barbados
Graeme Hall
Christ Church
Barbados
Tel: 1 246 535 5117
E-mail: **ps<at>agriculture.gov.bb**
- Ms Sonia A. S. Nurse - Director (Ag)
Barbados Meteorological Services
Civil Aviation Dept. Building
Charnocks, Christ Church
Barbados
Tel: 1 246 535 0016
Fax: 1 246 535 0029
E-mail: **sonia.nurse<at>barbados.gov.bb**

BELIZE

- Ms Catherine Cumberbatch - Chief Meteorologist
National Meteorological Service of Belize
Ministry of Transport and National Emergency
Management Organization (NEMO)
Philip Goldson International Airport
PO Box 717
Ladyville
Belize District, Belize
Tel: 011 501 630 3464
011 501 2252054/2012
Fax: 011 501 225 2101
E-mail: **ccumberbatch<at>hydromet.gov.bz**

CAYMAN ISLANDS

- Mr John K Tibbetts - Director General
Cayman Islands National Weather Service
88A Owen Roberts Drive
Grand Cayman
Cayman Islands
Tel: 1 345 945 5773
E-mail: **john.tibbetts<at>gov.ky**

GRENADA

Mr Hubert Whyte - Manager of Meteorology
 Grenada Airports Authority
 Maurice Bishop International Airport
 Point Salines
 St. George
 Grenada
 Tel: 1 473 444 4142 / 1 473 534 5262
 Fax: 1 473 444 1574
 E-mail: **hwhyte<at>mbiagrenada.com**

JAMAICA

Mr Evan G Thompson - Director
 Meteorological Service of Jamaica
 65 ¾ Half Way Tree Road
 Kingston 10
 Jamaica
 Tel: 1 876 960 8990
 Mobile: 1 876 577 3611
 Fax: 1 876 960 8990
 E-mail: **thompson<at>metservice.gov.jm**

MONTSERRAT

Mr Joseph Irish - Airport Manager
 John A. Osborne Airport
 PO Box 344
 Gerald's MSR 1110
 Montserrat
 Tel: 1 664 491 6218 / 1 664 495 1572
 Fax: 1 664 491 7688
 E-mail: **irishjl<at>gov.ms**

SAINT LUCIA

Mr Venantius Descartes - Director of Meteorological Services
 Saint Lucia Meteorological Services
 Department of Infrastructure, Ports and Energy
 Ministry of Infrastructure, Ports, Energy and Labour
 Union, Castries
 Saint Lucia
 Tel: 1 758 721 7157 / 1 758 4501210
 Fax: 1 758 453 2769
 E-mail: **vdescartes<at>gosl.gov.lc**
vdescartes<at>yahoo.com

ST KITTS AND NEVIS

Ms Sharon Rattan - Permanent Secretary
Ministry of Public Infrastructure, Post, Urban
Development and Transport
Water Department Building
Needsmust
St Kitts
Tel: 1 869 465 2521 ext 1115
Mobile: 1 869 767 0631
E-mail: **pspostsurbandev<at>gmail.com**

Mr Elmo Burke - Senior Meteorological Officer
St Kitts Meteorological Services
R.L. Bradshaw International Airport
St Christopher Air & Sea Ports Authority
Bird Rock
Basseterre
St Kitts
Tel: 1 869 465 2749
Fax: 1 869 465 9122
E-mail: **elmo.burke<at>scaspa.com**

Mr Daron Sutton - Airport Manager (Ag)
Vance W Amory Airport
Nevis Air & Sea Ports Authority
PO Box 741
Charlestown
Nevis
Tel: 1 869 469 9040 ext 222
Fax: 1 869 469 9046
E-mail: **deltas74<at>hotmail.com**

ST VINCENT AND THE GRENADINES

Mrs Corsel Robertson - Director of Airports
Aviation Services Department
Ministry of National Security Air and Sea Ports
Development
Administrative Complex
Bay Street, Kingstown
St Vincent and the Grenadines
Tel: 1 784 458 4011
Mobile: 1 784 494 9351
Fax: 1 784 458 4786
E-mail: **etjoshua<at>vincysurf.com**

ST VINCENT AND THE GRENADINES (CONT'D)

Mr Billy Jeffers - Manager – Meteorological Services
Aviation Services Department
Ministry of National Security Air and Sea Ports
Development
4th Floor Administrative Centre
Bay Street
Kingstown
St Vincent and the Grenadines
Tel: 1 784 491 3026 / 1 784 4935719
Fax: 1 784 458 0868
E-mail: **billy_jeffers_363<at>hotmail.com**

TRINIDAD AND TOBAGO

Mr Shakeer Baig - Assistant Director
Trinidad and Tobago Meteorological Service
P O Box 2141
National Mail Centre
Piarco
Trinidad and Tobago
Tel: 1 868 225 3441
Mobile: 1 868 462 4535
Fax: 1 868 669 4009
E-mail: **shakbaig<at>hotmail.com**

TURKS AND CAICOS ISLANDS

Ms Tiffany T Henfield - Meteorological Officer
Turks and Caicos Islands Airports Authority
Providenciales International Airport
Turks and Caicos Islands
Tel: 1 649 946 4420 / 1 649 2449091
Fax: 1 649 941 5996
E-mail: **tiffanyhenfield<at>tciairports.com**
thenfield<at>gmail.com

INSTITUTIONS/ORGANIZATIONS**CARIBBEAN METEOROLOGICAL ORGANIZATION**

- Mr Tyrone Sutherland - Coordinating Director
Caribbean Meteorological Organization
27 O'Connor Street
Woodbrook, Port of Spain
Trinidad and Tobago
Tel: 1 868 622 4711
Fax: 1 868 622 0277
E-mail: **tsutherland<at>cmo.org.tt**
- Dr. Arlene Laing - Coordinating Director-Designate
Caribbean Meteorological Organization
27 O'Connor Street,
Woodbrook, Port of Spain
Trinidad and Tobago
Tel: 1 868 622 4711
Fax: 1 868 622 0277
E-mail: **alaing<at>cmo.org.tt**
- Mr Glendell De Souza - Science and Technology Officer
Caribbean Meteorological Organization
27 O'Connor Street
Woodbrook, Port of Spain
Trinidad and Tobago
Tel: 1 868 622 4711
Fax: 1 868 622 0277
E-mail: **gde_souza<at>cmo.org.tt**
- Mrs Natalie Araujo-O'Brien - Finance and Administrative Officer
Caribbean Meteorological Organization
27 O'Connor Street
Woodbrook, Port of Spain
Trinidad and Tobago
Tel: 1 868 622 4711
Fax: 1 868 622 0277
E-mail: **naraujo-obrien<at>cmo.org.tt**

CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY

- Dr. David Farrell - Principal
Caribbean Institute for Meteorology and Hydrology
Husbands, St James
Barbados
Tel: 1 246 425 1362
Fax: 1 246 424 4733
E-mail: **dfarrell<at>cimh.edu.bb**

CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY CONT'D

Mrs Cheryl Joyette - Senior Administrative Officer
Caribbean Institute for Meteorology and Hydrology
Husbands, St. James
Barbados
Tel: 1 246 425 1362
Fax: 1 246 424 4733
E-mail: **cjoyette<at>cimh.edu.bb**

Mrs Andrea Applewhaite - Administrative Officer
Caribbean Institute for Meteorology and Hydrology
Husbands, St. James
Barbados
Tel: 1 246 425 1362
Fax: 1 246 424 4733
E-mail: **aapplewhaite<at>cimh.edu.bb**

Mr Fred Sambula - Guest Speaker
Caribbean Institute for Meteorology and Hydrology
Husbands, St. James
Barbados
Tel.: 1 345 922 2086
E-mail: **frsam<at>canpw.ky**

WORLD METEOROLOGICAL ORGANIZATION

Mr Oscar Arango Botero - WMO Regional Representative
World Meteorological Organization
Apartado Postal 7-3350-1000
San Jose
Costa Rica
Mobile: 506 2258 2370
Fax: 506 2256 8240
E-mail: **oarango<at>wmo.int**

SINT MAARTEN

Mr Joseph Nathaniel Isaac - Department Head
Meteorological Department Sint Maarten
114 Airport Road, Simpson Bay
St. Maarten
P.O Box 2006
Tel.: 1 767 520 3140
E-mail: **joseph.isaac<at>sintmaartengov.org**

LOCAL SUPPORT STAFF

- Ms Vincia Browne - Meteorological Officer I
St Kitts Meteorological Services
R.L. Bradshaw International Airport
St Christopher Air & Sea Ports Authority
Bird Rock
Basseterre
St Kitts
Tel.: 1 869 465 2749
Fax: 1 869 465 9122
E-mail: **vincia.browne<at>scaspa.com**
- Mrs Jasmine Hazel - Junior Clerk
Ministry of Public Infrastructure, Post, Urban
Development and Transport
Water Department Building
Needsmust, St. Kitts
Tel.: 1 869 465 2521 ext 1451
E-mail: **mpress9607<at>gmail.com**
- Ms Talginia Bradshaw - Junior Clerk
Ministry of Public Infrastructure, Post, Urban
Development and Transport
Water Department Building
Needsmust, St. Kitts
Tel.: 1 869 465 2521 ext 1451
E-mail: **tbradshaw.govt<at>gmail.com**

Council Statement Concerning ECCAA matters

RESOLUTION

Whereas the Quality Management System (QMS) was designed for Meteorological Services to provide services to Aviation as mandated by the World Meteorological Organization (WMO) and as required by the International Civil Aviation Organization (ICAO)

Be it Resolved that the Member States Representatives of the Organization of Eastern Caribbean States (OECS) present at the Caribbean Meteorological Organization 58th Caribbean Meteorological Council call upon the Eastern Caribbean Civil Aviation Authority (ECCAA) to give priority to providing oversight and expanding regulatory support (even through outsourcing) to Quality Management Systems in the Meteorological Services of the various States in the OECS region

ANNEX IV

CMO Draft Strategic Plan 2020-2023

DRAFT

STRATEGIC PLAN 2020-2023

**STRENGTHENING CAPACITY, ADDING VALUE, AND BUILDING RESILIENCE IN THE METEOROLOGICAL AND
HYDROMETEOROLOGICAL SERVICES OF THE CARIBBEAN**

1. Introduction

The availability and integration of weather, water, climate, and socio-economic information into policy making and societal action are critical to building resilience and realizing sustainable development goals in the Caribbean. The centrepieces for national and regional policy and action are the UN 2030 Agenda for Sustainable Development, the Paris Agreement on climate change, and the Sendai Framework for Disaster Risk Reduction. As governments, organizations and regional bodies align their development activities within these frameworks, CMO and National Meteorological and Hydrological Services (NMHSs) in particular, have enormous roles to play in supporting implementation. Governments, organizations, and regional bodies will increasingly rely on information from NMHSs as they pursue their sustainable development goals on land, at sea and in the air. The CMO Headquarters advocates for and works to procure the resources to allow national services to meet their mission. The concomitant decisions at all levels will continue to be contingent upon a better understanding of the changing threat levels from natural hazards, weather, water and climate extremes and climate change.

The provision of climate services at national levels for economic sectors in support of energy, water, health, and food production, among others, will be vital in building climate-resilient economies. To address these growing demands for actionable scientific information, the NMHSs of Member States will need targeted investments, scientific and technical development and strategic partnerships.

The consequences of high-impact weather, water and climate extremes are devastating for the safety of people, national economies, urban and rural environments, and food and water security. Extreme hydrometeorological¹ events have accounted for more than 80% of the world's natural disasters. (United Nations Office for Disaster Risk Reduction (UNISDR, 2015). According to the Intergovernmental Panel on Climate Change, these extremes are expected to occur with greater frequency and intensity as greenhouse gas concentrations continue to rise. Sea levels rise, also linked to climate change, will further increase the threat to the population of Members who are living in coastal areas.

2. Addressing the Gaps

All CMO Member States collectively contribute to the meteorological and hydrological infrastructure and facilities of the region. While this collective system is a public good that benefits all, the contribution and service performance among the Members continues to be uneven. For example, observation data are vital for a variety of applications, from flood and drought forecasts to routine decision-making, but only a limited set of station data are actually integrated into regional and international information systems. This may be due to technical limitations and/or failure to prioritize this obligation to the regional and global observation network and information system.

Observations and forecasts have value when used in decision-making. This entails integrating weather, climate, and water information with other environmental and socio-economic information in a decision-support system and continuous communication with decision-makers. NMHSs are facing substantial development needs and capability gaps in providing the weather, climate, water and related environmental information and services to meet national, regional and global requirements. The regional radar network, in particular, requires specialized knowledge and has costly maintenance issues. These typical challenges for the Member services centre around maintaining sustainable infrastructure, human resources, and the ability to benefit from the advances in science and technology.

¹ Hydrometeorological hazards are of atmospheric, hydrological or oceanographic origin.

Such deficiencies are often present in countries that are particularly vulnerable to natural disasters, which jeopardize effective protection of life and property and they slow down socioeconomic recovery. Narrowing the capacity gaps by sustaining government support, international cooperation, catalysing investment and targeted assistance is more important than ever in view of the increasing intensity of weather-, climate- and water-related extremes.

To address these capacity gaps, the CMO Headquarters embarked on an initiative to assist in upgrading meteorological services in the Turks and Caicos Islands to include forecasting capabilities. That activity was described in its Operational Plan for 2015-2019 and continues as part of an overarching priority of this Strategic Plan. The desire for having at least one senior forecaster in all CMO offices was recently noted in the WMO Climate Risk and Early Warning Systems (CREWS-Caribbean) review of Early Warning Systems (EWS) in the Caribbean in the wake of the catastrophic 2017 Hurricane Season. That EWS review found several issues, including the importance of having redundancy in communication systems. For example, the destruction of communication systems in Dominica by Hurricane Maria meant that there were no systems in place to prepare and communicate warnings of a subsequent tropical cyclone threat. While some Member States have emergency communication systems, others have begun addressing this deficiency, e.g., the Cayman Islands tested a new emergency satellite communication system in September 2018. The EWS review also found inadequate monitoring of hazards, such as coastal flooding and flash-flooding and highlighted the need for Quality Management Systems (QMS) for hydrometeorology; not only for warnings but for downstream development. The CMO HQ and the CIMH have experience in helping the National Meteorological Services develop QMS for aviation services—experience which can be applied for all areas of hydrometeorology.

While the Caribbean has a well-established regional hurricane forecast warning system, no program exists to facilitate regional collaboration and information exchange for non-tropical cyclone severe weather events, which are also deadly and destructive. Motivated by that need, the WMO, in partnership with the CMO, Météo-France, and NOAA (with initial funding from Canada) initiated a *Severe Weather Forecast Demonstration Project (SWFDP)* for the Eastern Caribbean with special arrangements for Haiti. The SWFDP will utilize forecast models from global centres and regional models of the CIMH and disseminate information to disaster management offices and other stakeholders.

The assessment of climate risk entails having knowledge of climate extremes, their current and potential variability under different future climate scenarios. By cataloguing and archiving extreme weather and climate events with the WMO **Regional Climate Centre** at CIMH, Member States can then link the events to any associated loss and damage and contribute to Article 8 of the Paris Agreement on “averting, minimizing and addressing loss and damage”.

3. Overarching Priorities

This Strategic Plan is focussed on addressing the most pressing developments and needs during 2020-2023, as part of fulfilling the long-term UN Sustainable Development Goals out to 2030. The Plan, which articulates expected outcomes and clear benefits to Members, will be focussed on these overarching priorities, which are aligned with the WMO Strategic priorities for 2020-2023:

- a) Enhancing disaster preparedness and reducing loss of life and property from extreme hydrometeorological events and severe weather.
- b) Supporting climate-smart decision making to build resilience and adaptation to climate risk.

- c) Supporting the strengthening and maintenance of observation networks and information services as critical components of disaster risk reduction and sustainable development frameworks.
- d) Enhancing the socioeconomic and national security value of weather, climate, hydrological, and related environmental services.

4. Strategic Priorities and Outcomes

- a) ***Enhancing disaster preparedness and reducing losses of life and property from extreme hydrometeorological events and severe weather.***

Ultimate Outcome 1 Support for delivery of authoritative, accessible, user-oriented and fit-for-purpose information and services to reduce the disaster risk of hydrometeorological extremes.

- **Intermediate Outcome 1** Enhanced capability of Members to develop, deliver, and utilize accurate and reliable weather, climate, water and related environmental impact-based forecasting services to mitigate against extreme hydrometeorological events.
 - **Immediate Outcome 1.1** Strengthened national multi-hazard early warning/alert systems to better enable effective responses to the associated risks.
 - **Immediate Outcome 1.2** Supported the implementation of the WMO Severe Weather Demonstration Project for the Eastern Caribbean (SWFDP) -a prototype for a regional early warning system for non-tropical cyclone severe weather.
 - **Immediate Outcome 1.3** Broadened provision of policy- and decision-support for drought and flood monitoring and prediction services.
 - **Immediate Outcome 1.4** Enhanced value and innovations in the provision of impact-based decision-support to mitigate weather, climate, and water-related hazards.
 - **Immediate Outcome 1.5** Support for the implementation of redundant communication systems to sustain warning systems in the event of multiple hazards and/or serial extreme events.

- b) ***Supporting climate-smart decision making to build resilience and adaptation to climate risk.***

Ultimate Outcome 2 Climate services and information integrated into policy and decision-making framework for building socioeconomic resilience and reducing climate risk.

- **Intermediate Outcome 2** Enhanced capability of Members to develop, access and utilize accurate, reliable climate, water and related environmental impact-based services to best support the policy-making and actions that mitigate against climate risks and build socioeconomic resilience.
 - **Immediate Outcome 2.1** Strengthened capability to provide climate services through investments and via public-private partners.

- **Immediate Outcome 2.2** Broadened provision of policy- and decision-supporting climate information and services.
- **Immediate Outcome 2.3** Supported the expansion of contributions to the Regional Climate Centre database for climate extremes, as called for by WMO Resolution 9 (Cg-17).

c) ***Supporting the strengthening and maintenance of observation networks and information services as critical components of disaster risk reduction and sustainable development frameworks.***

Ultimate Outcome 3 Enhanced observations and integrated information services for impact-based forecasting and decision-support for both routine activities and high-impact events

- **Intermediate Outcome 3** An integrated observational network optimized to ensure effective national coverage and accessibility for risk monitoring and numerical weather prediction. High quality fit-for-purpose measurements feeding a continuous data exchange underpinned by best practices in data management and data processing mechanisms.
- **Immediate Outcome 3.1** Optimized acquisition of observational data through the WMO Integrated Global Observing System (WIGOS).
- **Immediate Outcome 3.2** Improved and increased access to, exchange, and management of current and past observational data and derived products through the WMO Information System (WIS).
- **Immediate Outcome 3.3** Initiation of an operational radar working group to facilitate sharing of expertise and ensuring the maintenance and functioning of the Caribbean Radar Network.
- **Immediate Outcome 3.4** Members are using information services that facilitate integration of observations, numerical models, and tools to support impact-based forecasting and collaboration with disaster management and other core partners.

d) ***Enhancing the socioeconomic and national security value of weather, climate, hydrological, and related environmental services.***

Ultimate Outcome 4 Enhanced service delivery capacity of Members to ensure availability of essential information and services needed by governments, economic sectors, and citizens

- **Intermediate Outcome 4** Improved access to regional and global monitoring and prediction systems and utilization of weather, climate and water information and services that brings tangible benefits to Members.
- **Immediate Outcome 4.1** Addressed the needs of Members to enable them to provide and utilize essential weather, climate, hydrological and related environmental services.

- **Immediate Outcome 4.2** Assisted in the development and sustaining of core competencies and expertise.
- **Immediate Outcome 4.3** Scaled-up effective partnerships for investment in sustainable and cost-efficient infrastructure and service delivery.

5. Monitoring indicators

Immediate Outcome	Monitoring indicators
<p>1.1 Strengthened national multi-hazard early warning/alert systems to better enable effective response to the associated risks.</p>	<p>1.1.1 Number of Members participating in a global alert system</p> <p>1.1.2 Number of Members with a MHEWS integrated in a national Disaster Risk Reduction management system</p>
<p>1.2 Supported the implementation of the WMO Severe Weather Demonstration Project (SWFDP) in the Eastern Caribbean, a prototype for a regional early warning system for non-tropical cyclone severe weather.</p>	<p>1.2.1 Number of forecasters trained in the SWFDP concept</p> <p>1.2.2 Number of Members participating in the SWFDP</p> <p>1.2.3 At least one verification measure implemented for severe weather forecasts</p> <p>1.2.4 Users feedback on the usefulness of severe weather forecasts</p>
<p>1.3 Broadened provision of policy- and decision-supporting drought and long-term flood monitoring and prediction services.</p>	<p>1.3.1 Number of Members providing national flood and drought monitoring and prediction services</p> <p>1.3.2 Number of Members making use of RCCs and/or RCOFs</p> <p>1.3.3 User/stakeholder assessment of the relevance, usefulness and timeliness of outlooks/alerts for extreme climate events</p>
<p>1.4 Enhanced value and innovations in the provision of impact-based decision-support to mitigate weather, climate, and water-related hazards.</p>	<p>1.4.1 Number of Members using (a) web applications and (b) social media in warning delivery</p> <p>1.4.2 Number of Members with QMS for hydrometeorology and EWS.</p> <p>1.4.3 Number of Members using online platforms for integrating weather, water, and climate hazards with socio-economic data</p> <p>1.4.4 Number of Members with agreements between NMHSs and private sector/academia actors on(a) EWS service delivery and (b) maintenance of networks for EWSs</p>
<p>1.5 Support for the implementation of redundant communication systems to sustain warning systems in the event of multiple hazards and/or</p>	<p>1.5.1 Number of Members with backup communication and power systems</p> <p>1.5.2 A revised regional EWS with backup assignments for forecast and warnings</p>

Immediate Outcome	Monitoring indicators
serial extreme events.	
2.1 Strengthened capability to provide climate services through investments and by public-private partners.	<p>2.1.1 Number of Members with basic system for delivering climate services</p> <p>2.1.1 Number of Members with QMS for selected services (aviation, marine, hydrometeorology, EWS)</p>
2.2 Broadened provision of policy- and decision-supporting climate information and services.	<p>2.2.1 Number of Members making use of RCCs and/or RCOFs</p> <p>2.2.2 Number of Members organizing NCOFs</p> <p>2.2.3 Number of users accessing climate services through web platforms or other methods of service delivery (e.g., mail-in requests)</p> <p>2.2.4 User/stakeholder assessment of the relevance, usefulness and timeliness of climate information</p>
2.3 Supported the expansion of contributions to the Regional Climate Centre database for climate extremes, as called for by WMO Resolution 9 (Cg-17).	2.3.1 Number of Members contributing to the weather and climate impacts databases of the WMO RCC at CIMH
3.1 Optimization of the acquisition of observational data through the WMO Integrated Global Observing System (WIGOS).	<p>3.1.1 Percentage of the regional Earth system covered by observations (especially hydrosphere)</p> <p>3.1.2 Number of Members complying with WMO observation standards</p> <p>3.1.3 Number of Members implementing national observing system WIGOS</p>
3.2 Improved and increased access to, exchange and management of current and past observational data and derived products through the WMO Information System (WIS).	<p>3.2.1 Number of Members with national network monitoring and data management systems established</p> <p>3.2.2 Number of Members implementing data exchange policies, as per WMO Resolutions 40, 25 and 60.</p>

Immediate Outcome	Monitoring indicators
<p>3.3 Initiation of an operational radar working group to facilitate sharing of expertise and ensuring the maintenance and functioning of the Caribbean Radar Network.</p>	<p>3.3.1 Approved Terms of Reference for the radar operations working group</p> <p>3.3.2 Initial meeting/workshop held</p> <p>3.3.3 Online platform initiated for collaboration, troubleshooting, and information exchange</p>
<p>3.4 Members are using information services that facilitate integration of observations, numerical models, and tools to support impact-based forecasting and collaboration with disaster management and other core partners.</p>	<p>3.4.1 Number of Members using online platforms for integrating observations, model forecasts, with hydrological and socio-economic data for decision support and collaboration.</p> <p>3.4.2 Number of Members with agreements between NMHSs and private sector/academia actors on(a) service delivery and (b) maintenance of networks</p>
<p>4.1 Addressed the needs of Members to enable them to provide and utilize essential weather, climate, hydrological and related environmental services.</p>	<p>4.1.1 Number of NMHSs with strategic plans and legal basis for their operation</p> <p>4.1.3 Number of NMHSs with enhanced human and technical capacity to provide a range of services.</p>
<p>4.2 Developed and sustained core competencies and expertise.</p>	<p>4.2.1 Number of NMHS staff trained at WMO training centres and/or fellowships</p> <p>4.2.2 Number of NMHSs whose staff have adequate (to be defined) level of core competencies to meet national and international mandate</p>
<p>4.3 Scaled up effective partnerships for investment in sustainable and cost-efficient infrastructure and service delivery.</p>	<p>4.3.1 Number of NMHSs receiving international capacity development assistance</p> <p>4.3.2 Number of Members benefiting from catalyzed development projects</p> <p>4.3.3 Number of Members with legal basis for public-private partnerships</p> <p>4.3.4 Number of Members with socioeconomic benefit analysis conducted in the past X years</p>

ANNEX V

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ANNEX VI

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