REPORT OF THE SIXTY-FIRST MEETING OF THE CARIBBEAN METEOROLOGICAL COUNCIL

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CHAIRPERSON:

The Honourable Minister **Zulfikar Mustapha,** Ministry of Agriculture, Co-operative Republic of **Guyana**

VENUE AND DATE:

VIRTUAL PLATFORM
18-19 NOVEMBER 2021

1 OPENING OF THE SESSION AND ELECTION OF CHAIRPERSON

1.1. The Sixty-first Session of the Caribbean Meteorological Council was held on a Virtual Platform and hosted by the Government of the Co-operative Republic of Guyana on 18-19 November 2021. The Caribbean Meteorological Council is the Governing and policy-making body of the Caribbean Meteorological Organization (CMO).

1.2. ***Dr Garvin Cummings*****,** Chief Hydrometeorologist, Guyana Hydrometeorological Service, commenced the Opening Session of the Meeting by extending words of welcome after the Invocation and the playing of the National Anthem and a song celebrating Guyana.

1.3. ***Dr Arlene Laing***, Coordinating Director of the CMO, thanked the Government of the Co-operative Republic of Guyana for hosting and welcomed all participants to the Council Session. Dr Laing then outlined the history of the Caribbean Meteorological Organization, noting the Organization's fostering of scientific and technical cooperation among the Member States, building resilience to extreme weather, climate change, and other hazards. She highlighted the National Meteorological and Hydrometeorological Services (NMHSs) of CMO Member States as vital services whose primary mission is to save lives, livelihoods, and property but who also add value to the economies of the region and help the public and private sectors to make better decisions. She illustrated the weather, climate, and water prediction value chain and the role of Caribbean hydro-meteorological institutions and their benefit to societal decisions. She ended her presentation with a montage of societal needs fulfilled by the CMO (e.g., disaster management, agriculture, public health, water resources, energy and risk analysis).

1.4. ***Prof Petteri Taalas***, WMO Secretary-General, provided a video message in which he congratulated the Council on its 61st Session. He informed of several initiatives arising from the Extraordinary Congress held in October 2021. This included but was not limited to approval of standards for the *Global Basic Observation Network* (GBON), approval of a data policy to enhance early warning services, creation of new finance mechanisms to support Small Island Developing States (SIDS) and approval of new regional activities for the development of better service capabilities. Additionally, Professor Taalas gave insight into the 26th Meeting of the Conference of the Parties (COP26) Meeting and its focus on global warming and its effects on SIDS and climate adaptation. The WMO was also instrumental in the publishing of *the State of Climate in Latin America and the Caribbean*. Prof. Taalas ended by expressing his gratitude and willingness to provide continued support to the CMO, mentioning several new initiatives for the year 2022.

1.5. ***Dr Douglas Slater,*** Assistant Secretary-General (SG) of the Caribbean Community (CARICOM) Secretariat, delivered remarks on behalf of the CARICOM Secretary-General, *Ambassador Dr Carla Barnett*. Dr Slater acknowledged the CMO as one of the earliest institutions of CARICOM and its importance to multi-sectoral development. He mentioned issues arising out of the COP26 and its effect on Small Island Developing States (SIDS). Dr Slater also reflected on COVID-19 having further negative impacts on SIDS. He spoke positively of the development of meteorological strategic plans among eight (8) Caribbean countries and stressed the need to implement these in the wider national plans. The Assistant SG emphasized the need for continued investment into meteorology to facilitate a multi-sectoral risk resilient future. Data generated should be treated as a public good and freely shared. Dr Slater concluded his address by congratulating the CMO on the contributions made to environmental resilience and sustainable development in CARICOM and its active pursuit in enhancing coordination based on several international treaties and framework. Special mention was made of the WMO being a continued ally to the region. Dr Slater thanked meteorological practitioners and all others associates in the field for their great service to the Caribbean.

1.6. The feature address was delivered by ***the Honourable Minister Zulfikar Mustapha***. The Honourable Minister informed of the devastating effects of rain and flooding in Guyana in 2005, 2006, 2008 and 2021. Mention was made of the negative impact of rainfall events on the agricultural sector as well as households. As the Minister with responsibility for hydrometeorology, the Honorable Minster noted billions of dollars was spent and there was collaboration with *UN ECLAC* to mitigate social and public health impacts spurred on by the rainfall events. These ventures included the relocation of livestock, veterinary services, replacement of breeding stock and farm tools. Minister Mustapha informed the group of Guyana's commitment to building resilience and preventing further flooding by upgrading drainage and irrigation systems and the improvement of public weather service via their National Multi-Hazard Early Warning System and National Adaptation and Resilience Policies. Moreover, he mentioned the importance of sharing data, and improving technology and human capacity; to which Guyana has been fully committed. Guyana was the only country in the Caribbean to have a Hydrometeorological Service in charge of its own data, a low Carbon Development Strategy and a Water Quality Laboratory. The Honourable Minister thanked the CIMH and the CMO for the notable work being done within the Caribbean.

1.7. The Meeting elected ***The Honourable, Zulfikar Mustapha,*** Minister of Agriculture, of the Co-operative Republic of **Guyana** as the ***Chair of the Caribbean Meteorological Council*** for its 61st session and the intercessional period until the next annual meeting of the Council.

1.8. After the feature address and election, ***Ms Delma Nedd***, Permanent Secretary, Ministry of Agriculture, Guyana, delivered the Vote of Thanks to all speakers. She also noted the importance of the science of hydrometeorology to sustainable human development and by extension the Caribbean. PS Nedd ended by thanking the Honourable Ministers, special invited guests, and all participants for joining the opening of the 61st Council Session, with the Minister having other obligations, the remainder of the Session was chaired by Permanent Secretary, ***Ms Delma Nedd.***

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 WMO SPECIAL SESSION

3.1 The CMO invited the WMO Secretariat to provide a special briefing to the Council on the outcomes of the Extraordinary Session of the World Meteorological Congress, held on 11-21 October 2021, and the requested actions from CMO Members. ***Dr Enrico Fucile*** highlighted the three linked strategic infrastructure resolutions:

(i) WMO *Data policy* – international exchange of certain data for the provision of certain services, e.g., free exchange in support of the protection of life and property and for the well-being of all nations, and the return of high-quality prediction model output to all Members
(ii) *Global Basic Observation Network* (GBON) – Increased exchange of observations by all Members, facilitated by both the Data Policy and SOFF;
(iii) *Systematic Observations Financing Facility* (SOFF) - Technical and financial support for GBON implementation where it is most needed.

3.2 ***Dr Claudio Caponi***, of the WMO Secretariat, presented on the WMO support to the global water agenda, specifically: Resolution 4 - WMO *Vision and Strategy for Hydrology and its associated Plan of Action*; Resolution 5 - Advanced implementation of elements of the *Plan of Action for Hydrology* and Resolution 6 - *WMO Water Declaration* and *Water and Climate Coalition.* Council

was reminded that the plans for Hydrology are based on the Long-Term Ambitions of the WMO for Hydrology

a) No one is surprised by a flood;
b) Everyone is prepared for drought;
c) Hydro-climate and meteorological data support the food security agenda;
d) High-quality data supports science
e) Science provides a sound basis for operational hydrology;
f) We have a thorough knowledge of the water resources of our world;
g) Sustainable development is supported by information covering the full hydrological cycle;
h) Water quality is known;

4 CMO EXECUTIVE REPORTS

4(a) Coordinating Director's Report

4.1 The Coordinating Director reported on the activities and issues concerning the CMO Headquarters Unit since the previous session of the Council. The Council noted and discussed these activities and issues, particularly the follow-up to the 2021 Extraordinary Congress of the World Meteorological Organization and its 2021 Executive Council sessions, as they related to the Caribbean region, in general, and CMO Member States, in particular. The most pressing issue noted was the assistance to Member States to implement the *WMO Integrated Global Observing System (WIGOS)*, including the *Global Basic Observation Network* (GBON), and the *WMO Unified Data Policy*. Council discussed the support of CMO to Members in their preparations for the implementation of GBON including station designation and GBON data exchange. Council **urged** Members to support the Data Policy with regard to exchange of observational data, historical climate data, and data from prediction models.

4.2 Council was asked to note that, in advance of the WMO Extraordinary Congress, the Coordinating Director co-authored the article "*No Member left behind – Part 1. A developing country perspective on data exchange in meteorology*, for a special issue of the *WMO Bulletin* focused on the WMO Unified Data Policy (**https://public.wmo.int/en/resources/bulletin/no-member-left-behind-part-1-developing-country-perspective-data-exchange**)

4.3 The Council briefly reviewed the impacts of weather and other natural hazards in the region in 2021. It noted that the active hurricane season, which, while not as devastating to the region as 2020, had some high-impact systems, including Hurricane Elsa, Hurricane Grace and Tropical Storm Ida. In this regard, the Coordinating Director noted the excellent warnings issued by the affected Meteorological Services. Council was informed of the role of the Headquarters liaising with international organizations on behalf of Member States, to aid in preparedness and response to the multiple hazards that affected the region during 2021.

4.4 Council discussed and took note of the multiple hazards that affected the Caribbean during 2021. Most noteworthy were the major impacts of explosive eruptions of the ***La Soufrière*** on St Vincent that began on 9 April 2021 and displaced some 16,000 people, destroyed all vegetation in the designated red zone and 80% of vegetation in the orange zone, which are the main agricultural areas of the island. Barbados was also affected by ash deposits and to a lesser extent Saint Lucia. Council noted the support of the CMO Headquarters Unit to the regional response, including requests to NOAA/NESDIS for GOES satellite imagery rapid scan of the eruption, which provided showed minute-by-minute views of the eruption domain. The Coordinating Director also solicited expert guidance from former research collaborators in volcanology at the University of South Florida and the US Geological Survey.

4.5 Council was reminded of the critical role of regional cooperation and coordination across sectors for multi-hazard early warning, especially for the compounding effect of hydrometeorological on geological hazards, coincident with the COVID-19 pandemic. Council was informed that preparation for multiple hazards were discussed at a special session of the *43rd Hurricane Committee*, with contributions by the Coordinating Director and Principal of CIMH. The value of that preparation was evident when Hurricane Elsa passed over the volcano red zone on 2 July 2021, generating lahars and landslides and destroying infrastructure.

4.6 Council also noted that the Western Caribbean also faced hydrometeorological and geological hazards, with Haiti experiencing a 7.2 magnitude earthquake and heavy rainfall from Tropical Storms Fred and Grace between 11 and 16 August. The impacts of the deadly and destructive earthquake that struck Haiti on 14 August 2021, and was felt in neighbouring islands, were aggravated by heavy rainfall from Grace on 16 August, which hampered recovery and triggered fresh landslides.

4.7 Given the tremendous efforts of National Meteorological Services in ensuring effective multi-hazard early warning systems for the Caribbean during 2021, the Coordinating Director's initiated activities to showcase these extraordinary efforts. Specifically, the Coordinating Director collaborated with the Directors of affected CMO Member States and the Headquarters Unit supported the submission of three abstracts to the 102nd Annual Meeting of the American Meteorological Society (AMS) which was held 23-27 January 2022. Council noted that the three abstracts were accepted for presentation in the 10th Weather Ready Nations Symposium.

4.8 The Council noted other high-impact weather and climate events of 2021 including the historical floods in Guyana during May 2021, which had particularly adverse effects on the agricultural sector as well as thousands of households. The National Weather Watch Centre was itself affected when a significant electrical event caused a loss of power, Internet, and damage to Guyana's weather radar on 24 May 2021. Additionally, Council was reminded to consider the implications of record-breaking extreme heat in the Caribbean in recent years, as reported in the WMO *State of Climate in Latin America and the Caribbean*. Caribbean islands, for whom extreme heat was an unfamiliar hazard, would need to develop measures to protect public health, particularly of the elderly and very young, as well as other necessary adaptation by sectors such as energy, agriculture, and tourism. Furthermore, Council was asked to note episodes of poor air quality and visibility due to Sahara dust outbreaks and volcanic ash from the La Palma volcano in the Canary Islands that affected the region during October 2021.

4.9 Council approved the efforts made by the Headquarters Unit to manage the effects of Coronavirus 2019 (COVID-19) pandemic. Specifically, Council noted the Continuity of Operations established to enable the work of the Headquarters to continue while the staff worked remotely and the health protocols established to ensure the health and safety of the staff when the offices reopened.

4.10 Council was informed that during the summer the CMO Headquarter begun contingency planning with the Caribbean Institute for Meteorology and Hydrology (CIMH) to hold Virtual Meetings of the 61st CMC Session, 58th Meeting of the Board of Governors of CIMH, and 2021 Meeting of the Directors of National Meteorological Services.

4.11 Council noted that the CMO Headquarters through an agreement with the WMO was supporting National Meteorological and Hydrometeorological Services developed model meteorological legislation and policy that was endorsed by Member States in June 2021. Council noted that eight member States have been receiving support to adapt the model legislation for their national meteorological services including defining their roles and responsibilities, the extent of their authority, their organizational structure, and funding mechanisms. The Organization of Eastern

Caribbean States (OECS) provided assistance and review oversight of the project deliverables. The development of meteorological legislation is supported by the WMO *Climate Risk and Early Warning Systems (CREWS) Caribbean* project for the period 2020-2021.

4.12 Council noted the CMO Headquarters support for strengthening the capacity at the national level, by collaborating with the WMO CREWS Caribbean Project to develop Strategic Plans, National Frameworks for Weather, Water, and Climate Services, and complementary Action Plans for the National Meteorological Services in eight Member States.

4.13 It was also noted by Council that the CMO Headquarters contributed to the development of a Strategic Roadmap for Multi-Hazard Early Warning Systems in the Caribbean, through the CREWS Caribbean Project, and will be contributing to the Priority Activities, including as lead coordinator on the development of a multi-sensor precipitation grid over the Eastern Caribbean with the Barbados weather radar as one of the primary data sources. The project includes CIMH, as the technical lead, and the National Meteorological Services of Barbados, Saint Lucia, and St Vincent and the Grenadines.

4.14 Council noted that the Coordinating Director, the Permanent Representative of the British Caribbean Territories with WMO, led a delegation of 12 experts to the ***WMO Extraordinary Congress*** 2021, held virtually in October 2021. In preparation for the Congress, the Coordinating Director provided information about the major decisions of the Congress, to the Governments of the WMO Members of CMO Member States and encouraged the participation of their Permanent Representatives and Hydrological Advisers in the Congress. Council was informed that all but one of the WMO Members was represented at the Congress. The Belize delegation included the Honourable Minister that oversees the Meteorological Service and three delegations included hydrological advisers. Council was asked to note that two Members are not compliant with WMO General Regulation 6, with regard to the formalizing of their Permanent Representative with WMO. Council **urged** to WMO Members to formalize their Permanent Representatives and Hydrological Advisers with WMO.

4.15 The Council noted the CMO Headquarters attendance at the ***WMO Executive Council*** *73rd and 74th Session*s, held on a virtual platform, and the implications of the decisions of the Executive Council for CMO Member States, including the implementation of the Unified Data Policy, the WMO Integrated Global Observing System (WIGOS) and the Global Basic Observation Network (GBON). In June 2021, the Coordinating Director began serving on the WMO *Staff Pension Committee* as a Member of the Executive Council.

4.16 Council was informed that the Science and Technology Officer, ***Mr Glendell De Souza***, was selected as the Chair of the ***WMO RA IV Services Committee***, a new regional subsidiary body that is aligned with the WMO Services Commission.

4.17 Council noted that the Coordinating Director, as the RA IV representative on the WMO Research Board was the lead author for the Concept Note on research "*Innovation in Regions*"; liaised with regional institutions and WMO Research Programmes; and led other activities that support the research priorities of RA IV (North America, Central America and the Caribbean).

4.18 Council was reminded of the many activities of the CMO Headquarters and CIMH that are aimed at regional implementation of global programmes and initiatives, particularly those initiated by the WMO as they relate to the Caribbean region in general and CMO Member States in particular. Among these continues to be support for WMO regional activities related to the *WMO Integrated Global Observing System* (WIGOS). The CMO Headquarters, CIMH, and some of the National Meteorological Services have been working with the WMO Secretariat to advance the implementation of WIGOS. The CMO Headquarters and the Trinidad and Tobago Meteorological

Services has been working with colleagues in Canada and the United States of America (USA) on the development of a Regional WIGOS Centre for WMO RA IV. Further WIGOS activities was discussed under Agenda item 8.

4.19 Council noted the CMO Headquarters advice to governments on the development of the National Meteorological Services including:

- Advising the Turks and Caicos Islands (TCI) Airport Authority on the development of their National Meteorological Service and worked with the new Director of Meteorology, *Dr Holly Hamilton*, to organized meetings with CIMH and the Bahamas Department of Meteorology (BDM) to schedule attachments in the BDM forecast office. Additional guidance was provided on human and technical capacity development and collaborations with the TCI Department of Disaster Management and Emergencies, including the acquisition of a weather radar.
- The Coordinating Director is chairing the *Trinidad and Tobago Meteorological Service (TTMS) Transformation Committee*, at the request of the *Ministry of Public Utilities* of the Republic of Trinidad and Tobago. The Committee was tasked with developing a legal framework for the transformation of the TTMS, following a review of its Strategic Development Plan 2015-2024, operations, human resources, public weather services, and observation network.
- Advised on the development of the St Kitts and Nevis National Meteorological Services following their new Strategic Plan 2021-2025, which was developed with support from the WMO-CMO implementing arrangement. The arrangement is also supporting the development of national Meteorological legislation adapted from the Model Meteorological Legislation. The CD and STO have provided reviews of proposals for advancing the goals of the Strategic Plan through a *Green Climate Fund Readiness project*. The national project was being developed with the support of the Caribbean Community Climate Change Centre. The Headquarters Unit also advised the St Kitts Meteorological Service on the transitioning of the *Terminal Aerodrome Forecasts* (TAFs) for St Kitts to forecasters in St Kitts and Nevis; TAFs are currently provided by the US National Weather Service Office in San Juan, Puerto Rico.

4.20 Council was asked to note certain capacity development and outreach activities of the Coordinating Director, which included:

- Solicited funding from the US National Weather Service International Affairs for a satellite meteorology course to train nine forecasters;
- Organized and chaired a session on Trade wind weather as part of the Post-EUREC^{4}A Symposium, held in February 2021;
- Gave a keynote presentation on the benefits of the CREWS Initiative to the Caribbean during the VII Regional Platform for Disaster Risk Reduction (DRR) in the Americas and the Caribbean, 1 November 2021. Also gave presentation on Lightning and Wildfires.
- Served as an External Examiner for The University of the West Indies, Department of Physics, Doctoral Thesis of *Mr Jayaka Campbell*

4.21 Council was informed of two symposia that were organized by the CMO Headquarters since:

(i) The 2nd *Caribbean symposium on operational hydro-meteorology* from 15-17 December 2021, on a virtual platform, in collaboration with Varysian Ltd. The symposium had more than 100 attendees; featured key experts in international operational hydrometeorology and hydrology; and roundtable discussions on topics such as “Advancing partnerships between meteorological and hydrological agencies in the Caribbean”, “Progress in data capture and sharing”, and “Defining and growing stakeholder services”.

(ii) The CMO Headquarters and the WMO hosted the first ever *Symposium on Lightning and Lightning Safety Awareness* from 19-20 May 2021, on a virtual platform. There were over 130 international participants from 28 countries, several prominent international presenters spoke on lightning safety, lightning injuries, public education and communications, engineering, lightning detection, and lightning protection. Participants included stakeholders from aviation, health, sports, energy, and other sectors. Following the symposium, the Coordinating Director was invited to present at the International Lightning Safety Day Preparation Conference, on 28 May 2021 and authored an article about the symposium in *Meteoworld*, (**https://public.wmo.int/en/resources/meteoworld/symposium-lightning-and-lightning-safety-awareness**).

4.22 Council was informed of various activities undertaken by the CMO Headquarters in support of the regional and global water agenda, including the organization of the symposium on hydro-meteorology and contributing to the WMO Vision and Plan of Action for Hydrology; active participation in various forums of the *Global Water Partnership–Caribbean* (GWP-C), including their Stakeholder Consultations on development of a *Regional Action Framework for Integrated Water Resources Management* (IWRM) for the CARICOM Region.

4.23 Due to the recognition of the paramount role of the ocean in the sustainable development of Small Island Developing States, Council noted that the Coordinating Director, *Dr Arlene Laing*, was the lead author of *WMO Bulletin* article on ocean science and services in SIDS (**https://public.wmo.int/en/resources/bulletin/Products_and_services/oceanic_science_SIDS**) Co-authors are *Dr David Farrell,* Principal of CIMH, and *Mr Ofa Fa'anunu*, President of WMO Regional Association VI and Director of the Tonga Meteorological Service). Council further noted that the Coordinating Director was one of five presenters at the *WMO RA IV Ocean Side Event* to the 18th Session of WMO Regional Association IV in February; describing the short and long-term research priorities in the region and linking research innovation and services to customer needs in the coastal and maritime sector. Additionally, Council noted the CMO Headquarters support to the WMO in developing Marine Meteorology Service Delivery training to benefit regional forecasters. The planned adaptation and delivery of the training for the Caribbean was scheduled for 2022.

4.24 Council noted various other activities related to weather and climate resilience and disaster risk reduction in which the Coordinating Director actively participated in 2021. These included being an invited speaker to the *Climate Adaptation Summit 2021*, a global conference on 25-26 January 2021, which highlighted adaptation efforts needed to respond to the effects of climate change and was opened by, the UN Secretary General ***Antonio Guterres.*** The Coordinating Director was invited to present a seminar to the Institute for Climate and Atmospheric Sciences, University of Leeds, in March 2021.

4.25 CMO Headquarters Unit continued to advance disaster risk reduction in cooperation and coordination with Caribbean Disaster and Emergency Management Agency (CDEMA), CIMH, and other regional institutions. Through the Regional Early Warning System Consortium led by CDEMA, CMO HQ aided in the development of a Multi-Hazard Early Warning System Checklist. Additionally, the Coordinating Director has been serving on the Steering Committee of a project by WMO and CDEMA to strengthen early warning operational arrangements between National Disaster Organizations and National Meteorological and Hydrological Services.

4.26 Council noted that the CMO Headquarters participated in various CARICOM activities including: Climate-related meetings in 2021, starting with the CARICOM Heads of Institutions Climate Coordination Activities in January 2021 and continuing through the recent Pre-COP26 Ministerial Preparation Meeting held on 22 October. Council further noted that the Coordinating

Director provided oral and written contributions to the 11th Meeting of CARICOM and the UN System in July.

4.27 Council further noted that the CMO Headquarters contributed to the development of the CARIFORUM Post-Cotonou Regional Programming, by providing reviews of the draft programming and participating in the CARIFORUM regional consultation meetings in 2021, and continued to provide input to the Caribbean Community Secretariat Strategic Planning. The Finance and Administrative Officer continues to serve on the CARICOM RBM Leadership Group and the Finance Committee of the Caribbean Community Administrative Tribunal (CCAT).

4.28 The Coordinator Director's report to Council also provided an update on the Status of the Strategic Priorities of the Headquarters Unit.

4.29 On a Headquarters staff-related matter, the Council recalled that, because of the small size of the staff complement, the Headquarters Unit does not have a staff pension fund, but instead operates a Headquarters ***Staff Terminal Benefit Fund.*** The Fund was established in 1995 "for the purpose of securing lump sum payments of moneys for such of its present and future employees employed at the Headquarters Unit in Trinidad and Tobago". The Fund requires three Trustees as signatories, which have been since inception: the Coordinating Director, the Director of the Trinidad and Tobago Meteorological Service and the Administrative Officer, representing the Administration, Council and Staff respectively. The third trustee has always been the incumbent Director of the Trinidad and Tobago Meteorological Services with approval from the parent Ministry. However, since the retirement of the former Director of the TTMS in 2018, the third Trustee position has been vacant. The legal expert from the parent Ministry of the TTMS presented information that precluded the Director (Ag) of the TTMS from serving. Therefore, Council was asked to approve the selection of another Member State to serve as the Third Trustee. After much discussion, **Jamaica**, volunteered to represent the Council as a Trustee on the Staff Terminal Benefit Fund, barring any legal impediment.

4.30 Council noted and discussed the dramatic reduction in the level of financial contributions received from Member States, which was only 30% by 15 October 2021, compared with 53% at the same period in 2020. Only, six Member States made their full contribution by 15 October. Ten (10) Member States failed to meet their current obligations to the budget of the CMO Headquarters up to 15 October. Council was asked to note that, with a lower-than-normal level of Member contributions, some approved activities had to be postponed, such as the hiring of a *Project Development Officer*, which was approved by Council at CMC59 (Anguilla, 2019). Activities to support the development of Member States had to be delayed or curtailed because of the lack of support to the CMO HQ budget.

4.31 Council was informed that in October 2022, the Science and Technology Officer (STO), ***Mr Glendell De Souza***, will be retiring, after serving with great dedication as a pioneer in the position since 2005. The one-time costs to the budget of the Headquarters of the STO succession include an overlap period with the Science and Technology Officer Designate; discussed under Item 7.

4.32 Council was informed that the CMO Headquarters is supporting the CIMH in its implementation of the Intra-ACP Climate Services and Related Applications (ClimSA) Programme on behalf of the CMO.

4.33 The Coordinating Director briefed the Council on some of the scientific, technical and training events in which technical staff of the CIMH and the National Meteorological and Hydrometeorological Services participated and the Headquarters facilitated. Council noted that the schedule of activities undertaken by the CMO Headquarters had been quite heavy, despite the cessation of face-to-face meetings.

4.34 **The Council**:

(i) **Noted** the activities and issues concerning the CMO Headquarters in 2021, in particular, the implementation of legal mandates and strategic plans in Member States, the response of the CMO Headquarters Unit to the multiple hazards of COVID-19 pandemic, volcanic eruption, and hydro-meteorological hazards, the engagement with disaster risk reduction and the hydrology community, as well as those issues concerning the wider Caribbean Community;
(ii) **Discussed** the impact of the 2021 hurricane season, other high impact weather, volcanic eruption, on the region and, in particular, the impact on CMO Member States;
(iii) **Nominated** Jamaica's delegate as the Third Trustee for the CMO Headquarters Staff Terminal Benefit Fund.
(iv) **Noted** the progress on the CMO Headquarters Strategic Plan 2020-2023.

4(b) CIMH Principal's Report

4.35 The Principal made a presentation to the Council on the activities of the *Caribbean Institute for Meteorology and Hydrology* (CIMH). Given the time constraints of the Session, the report was a condensed version of the report delivered to the CIMH Board of Governors. The report was prefaced by the statement that the global COVID-19 pandemic, which commenced in 2020, continued its devastating impact globally in 2021, with more devastating impacts on Barbados than in the previous year.

4.36 The report outlined the:

- The technical accomplishments of the CIMH and their regional and global impacts;
- The CIMH's significant contributions to global and regional capacity development;
- The CIMH's achievements in the area of resource mobilization and project development;
- The fiscal challenges facing CIMH;
- New initiatives including the development of a new centre within the CIMH;
- The Institute's draft strategic plan for the period 2020 – 2024 previously presented in 2020.

4.37 The Council was informed that since March 2020, CIMH has maintained a remote work arrangement for staff, encouraging those persons capable to work remotely. Classes were conducted remotely with some exceptions. Contact between staff and between staff and students have been minimized. Some persons who tested positive for the virus reported their status and followed national protocols. To date, there were no known cases of viral transmission between staff and staff and students, indicating that the approach currently being taken was effective.

4.38 The Principal stated that as a result of the economic hardships faced by CMO Member States due to the COVID-19 pandemic, subventions are low compared to 2019 and cash flow was highly uncertain, which has impacted operational planning at CIMH. However, the Principal noted that subventions received during the reporting period of January 1 through September 30, 2021 were better than for the corresponding period in 2020.

4.39 The Principal reminded the Council of the evolving functions of the CIMH which includes (i) Training – WMO Regional Training Centre (RTC) and coordinator of the Bachelor of Science (BSc) in Meteorology programme at The University of the West Indies, (ii) regional centre for research and development in the areas of meteorology, climatology and hydrology/water resources management; (iii) WMO Regional Instrument Centre that supports instrument procurement, maintenance and

calibration, observation network design and deployment, (iv) Regional Climate Data Centre responsible for climate data collection, quality assurance, archiving and dissemination, (v) WMO designated Regional Climate Centre (RCC) for the Caribbean responsible for coordinating the implementation of the Global Framework for Climate Services (GFCS) in the region, (vi) Caribbean Centre for Climate and Environmental Simulations (CCCES) which produces among other things daily high-resolution numerical prediction products that support weather, Sahara Dust, volcanic ash and wave forecasts for the region and (vii) the Pan American Node of the WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS). At the recently concluded CIMH Board of Governors Meeting, it was agreed that the functionality of CIMH would be expanded to include a Regional Marine Forecast Support Centre (RMFCS), which would take advantage of some of the resources already present at the CIMH.

4.40 Council was informed of the key achievements and challenges of the CIMH during 2021. The report identified emerging training, research and business opportunities that the CIMH was pursuing to (i) improve the quantity and quality of products and services it delivers to stakeholders including the National Meteorological and Hydrological Services (NMHSs), WMO, United Nations Development Program (UNDP), World Bank Group, Caribbean Development Bank (CDB), Caribbean Disaster Emergency and Management Agency (CDEMA), Caribbean Public Health Agency (CARPHA), Caribbean Center for Renewable Energy and Energy Efficiency (CCREEE), Caribbean Agricultural Research and Development Institute (CARDI) and the Caribbean Tourism Organization (CTO) among others and (ii) enhance revenue generation at CIMH to alleviate the impacts on the work programme of the annual shortfalls in subventions.

4.41 The report outlined the:

- The technical accomplishments of the CIMH and their regional and global impacts;
- The CIMH's significant contributions to global and regional capacity development;
- The CIMH's achievements in the area of resource mobilization and project development;
- The fiscal challenges facing CIMH;
- New initiatives including the development of a new centre within the CIMH;
- The Institute's draft strategic plan for the period 2020 – 2024 previously presented in 2020.

4.42 Council noted that the CIMH continued to make significant contributions to the Caribbean and internationally in the areas of disaster risk reduction, water resources management, health, energy, agriculture, and tourism. These contributions were accomplished through CIMH's training, education, innovation, research & development initiatives that have been built through regional and international collaborations.

4.43 The Principal informed the Council of the Memorandum of Understanding (MoU) signed between the US National Oceanographic and Atmospheric Administration (NOAA) and the CIMH in June 2021. The duration of the MoU is currently five (5) years. The MoU addresses areas of cooperation between the Participants with particular focus on (i) remote sensing research, tools, applications, and products, (ii) weather, climate, and environmental observations, monitoring, modelling, forecasting, and early warning systems (EWS); (iii) Enhancing the development of science and applications to inform services for weather, water and climate risk management and resilience; (iv) strengthening relevant partnerships and regional coordination in the Caribbean. Council was informed there were no financial commitments and obligation embedded in the arrangement.

4.44 Council was also informed of the draft MoU between the CIMH and the US Geological Survey (USGS). The performance period in the draft MoU is ten (10) years. The MOU was expected to be signed before the end of 2021. Council was informed that areas of focus under the MoU include (i) critical mineral resources, (ii) mineral processing efficiencies and beneficiation, (iii) evaluation of mining waste for resource extraction, (iv) geophysics, (v) basin hosted resources, (vi) hydrology and water resources management and (vii) biodiversity. As with the NOAA MoU, no financial commitments or obligations are included in the draft MoU.

4.45 The Principal informed the Council of CIMH's participation in the previously described CREWS programme which is jointly implemented by World Bank Group/GFDRR, the WMO and the United Nations International Strategy for Disaster Reduction (UNISDR) with key regional partners CIMH, CMO Headquarters Unit and CDEMA. Council was informed that the World Bank Group had contracted the CIMH (USD 50,000) to support aspects of the programme: (i) Review of the latest draft of the Regional Roadmap under preparation; (ii) Support regional activities for the preparation and implementation of Priority Activity (PA) "Development of a Multi-sensor Precipitation Grid"; (iii) Support regional technical leadership and coordination for the preparation and implementation of PA "Support the Transition to Impact-Based Forecasting".

4.46 Council was also informed that the CIMH was also benefiting from financial support (USD 225,000) under the WMO component of the CREWS programme. The full tranche of funds were originally earmarked to support the Caribbean Climate Outlook Forums (CariCOF), however, with the onset of the global COVID-19 pandemic impacting the way the forum is currently being delivered, a portion of the funds are now being reprogrammed to support a number of new activities including the support for the Regional Marine Forecast Support Centre initiative.

4.47 Council was informed that the contract for the five-year Intra-ACP [African, Caribbean, Pacific Group of States] Climate Services and Related Applications (ClimSA) project, which aims to improve the production, access to and use of climate information, services and applications for decision makers, was signed with the Principal signing the contract on behalf of the CMO, the value of the contract is EUR 9 million. Council was further informed that it had been agreed that the CIMH would function as the implementing and executing agency for the regional programme which it developed. Council was further informed of the programme's Expected Outcomes were – *(i)* Interaction between the users, researchers and climate services providers in the Caribbean region was structured; *(ii)* Provision of climate services at Regional and National levels was effectively guaranteed and secured; *(iii)* Access to climate information was improved; *(iv)* Capacity of Caribbean region to generate and apply climate information and products relevant to particular concerns enhanced; *(v)* Climate-informed decision-making is enhanced and climate services are mainstreamed into policy processes at the regional and national levels.

4.48 The Council was informed that CIMH signed a 4-way MoU aimed at enhancing Collaborations on Climate Change Approaches with the USAID, the Caribbean Community Climate Change Centre and CDEMA. The MoU provides a broad framework for cooperation between the signatories and strengthens the institutional ties between them with the aim of ultimately building regional resilience to the impacts of climate change. The details of the MoU were shared with the Council. No financial obligations are spelled out in the MoU.

4.49 The Council was reminded of the USAID Strengthening Disaster and Climate Resilience (SDCR) In the Eastern and Southern Caribbean Project. Funding under the 2-year project which commenced in 2019 and slated to conclude in mid-2022 was USD 1.8 million. The Principal outlined key outputs of year-2 of the project including (i) the procurement of drones to CIMH, CDEMA, Dominica, and St. Vincent and the Grenadines, with the latter drone being critical to monitoring the effusive phase of the La Soufriere eruption in 2021; (ii) procurement of a drone-mounted lidar to support watershed and community level mapping, (iii) training of 15 persons from the region to

interpret and process remotely sensed data/imagery. Council was informed of the outstanding activities under the programme, in particular, the 9-month Caribbean Youth Livelihoods Internship Programme (CYLIP), developed by the CIMH, which received USD 50,000 in funding. CYLIP was CIMH's attempt to, in part, to address youth unemployment by fostering innovative entrepreneurship programmes in the earth and atmospheric sciences and related disciplines. Participants in the programme are recent graduates from economically disadvantaged communities.

4.50 Council was reminded of CIMH's ongoing discussions with the International Atomic Energy Agency (IAEA) on collaboration in water resources management and isotope hydrology. In particular, Council was informed that the regional isotope hydrology laboratory proposed by the IAEA for CIMH has been delayed due to the global COVID-19 pandemic. The laboratory would support Tritium monitoring in rainwater collected across the region.

4.51 Council was informed of CIMH's continued support of the various WMO programmes; approximately 8 members of staff currently sit on WMO Expert Committees, representing the British Caribbean Territories (BCT), with Ms. Kathy-Ann Caesar currently Co-Lead of the Expert Team on Education, Training and Competency. The CIMH continue to host and maintain the WMO Global Campus Training Events Calendar, which was designed and built by the CIMH. CIMH contributed to the authorship of the State of the Climate in Latin America and the Caribbean 2020.

4.52 The Principal informed Council that the CIMH continued to collaborate with CARICOM and many Regional Institutions in the execution of their respective work programmes, such as, the contract between CCREEE and CIMH to support its Integrated Risk and Resilience Programme for the Caribbean energy sector. CIMH's Sahara Dust products are being integrated into CARPHA's health alerts. CIMH was contracted by the CCCCC to support the implementation of the EU GCCA+ programme. CIMH continues to work with the CTO with the development and delivery of climate services for the tourism sector. Finally, CIMH continued to provide to multi-hazard impact-based forecasting services to CDEMA prior to the impact of tropical storms.

4.53 The Principal reported on the continued benefits of the international EUREC^{4}A field campaign conducted east of the Caribbean islands during January-February 2020. CIMH was a co-developer of the international field campaign, which attracted more that 200 scientists from the region, the USA and Europe well as significant resources. The Principal noted that (i) manuscripts related to the experiment were beginning to enter publication; (ii) interns from the CIMH were preparing a journal article related to the experiment, and as well as posters and talks for international conferences; and (iii) a new field campaign for summer 2024 was being developed. Council was also informed that a CIMH staff member was invited to participate in a field campaign in the Arctic scheduled for Spring 2022.

4.54 Council was informed of the status of the CIMH training programme. The Principal noted that COVID-19 continued to impact the courses due to lack of face-to-face interactions in some key areas. CIMH continued to move towards a blended learning arrangement to reduce costs and introduce efficiencies. However, it was noted that several challenges were currently being faced, in particular (i) many students appear not mentally ready for online learning; (ii) some students lack the resources to effectively participate in online learning; and (iii) some Services continue to utilize students even though they are supposed to be on study leave. The Principal noted that the Hydrology programme continues to see low enrolment.

4.55 The Principal informed the Council that the Regional Climate Center continued (i) to deliver quality products and services to the region and (ii) to identify ways to enhance the usability of its products and services to sector practitioners. Council was informed of the outstanding consultancy work the RCC delivered to the Organization of Eastern Caribbean States (OECS) to risk-inform its climate adaptation and climate resilience programmes; with extremely positive feedback from OECS

and its partners. Finally, the Council was informed that the Caribbean Climate Outlook Forums, though delivered online in 2020 and 2021, continued to attract significant participation.

4.56 The Council was informed of the significant contributions the CIMH made to disaster risk reduction efforts across the Caribbean in 2021. The volcanic ash and gas transport simulation platform that supports the regional volcanic hazards early warning systems provided critical information to NMHSs, disaster managers, and other decision-makers during the April 2021 eruption phase of the La Soufrière volcano on the island of St. Vincent and a primary source of ash and gas transport information for many regional stakeholders. CIMH was tasked by the Government of Barbados to present it with impact related reports during April 2021.

4.57 The Council as informed that the CIMH utilized its emerging SAR/inSAR satellite image processing skills and its impact-based forecast support skills immediately following the August 14, 2021 earthquake to risk-inform CDEMA and the Government Haiti of the risks posed by approaching Tropical Depression Grace, which eventually impacted the island on August 16, 2021.

4.58 The Council was informed of the significant support the CIMH provided to the Government of Barbados following the passage of Tropical Storm Elsa. The CIMH used one of its drones to support the Barbados Department of Emergency Management with its impact assessments. Staff and an intern at CIMH subsequent developed a platform to support visualization and quantification of the impacts. The platform has received significant compliments from a number of local officials. The platform is portable and can be made available to other Member States.

4.59 Council was further reminded that it was Member States contribution that funded the CIMH. Although Members expectation should be adjusted based on the subventions that were received, however, that was not the case. CIMH met Members expectations by conducting low risk commercial consultancies, utilization of project overheads to support operations, funding received from the University of the West Indies and Cave Hill Campus for training provided. However, there were emerging challenges to these financial operations, which include:

- A need to strengthen fiduciary systems to meet international development standards;
- Staffing needs and organizational structure would have to be addressed to match the increasing opportunities;
- Addressing the infrastructural needs in the post-COVID-19 world.

4.60 **The Council**

Noted the Principal's Report.

4(c) The CIMH's Board of Governors Report

4.61 The Chairperson of the CIMH Board of Governors (BoG) presented to the Council, the following decision that was made at the 58th Meeting of the Board, which took place on 15-16 November 2021.

With reference to Document 4.7 – Staffing Matters:

(i) The BOG **agreed** to

a. converting the vacant post of Administrative Officer II to an Executive Assistant position for the Principal;

b. the hiring of a Technical Officer I to support the Chief Meteorologist;

c. the provision of a responsibility allowance for the recommended Senior Security Officer.

d. Mr. Marvin Forde remaining as acting Chief Technical Officer.

With reference to Document 4.9 – Campus Security:

(i) The BOG **agreed** to

a. the recommendation of a Senior Security Officer at the CIMH.

With reference to Document 5.1 – Estimates of Expenditure for the Financial Year 2022:

(i) The BOG **agreed** to the Estimates of Expenditure of **USD X,XXX,XXX** (**BBD X,XXX,XXX**), which is an increase of 7.4 percent relative to the Estimates for FY2021, (2 percent increase compared to the Estimates for FY2020), to be presented to the Council.

With reference to Agenda Item 6 – Strategic Plan 2020 - 2024 :

(i) The BOG **agreed** to

a. review the Strategic Plan 2020 - 2024

With reference to Any Other Business:

(ii) The BOG **agreed** to

a. the establishment of the Regional Marine Forecast Support Centre.

4.62 **The Council**

Noted the decisions emanating from LVIII Meeting of the Board of Governors.

5 STATUS OF ACTION FROM THE PREVIOUS SESSION

5.1 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 CMC60 (Virtual) 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.

5.2 Council was informed of two decisions from the previous meeting that would be reported on in this Session. For CMC60, Action Item 12.3, legal experts of the Ministry of Public Utility, the parent Ministry for the Trinidad and Tobago Meteorological Service (TTMS) reviewed the Trust Deed for the CMO Headquarters Unit *Staff Terminal Benefit Fund* and determined that the Director of the Trinidad and Tobago Meteorological Service may not serve as a Trustee for the Terminal Benefit Fund. The Human Resources-related CMC60 Action Items 12.2 and 12.2 were reported under "Other Matters", CMC61 Agenda Item 12.

5.3 The **Council:**

(i) **Noted** the Status of Actions from CMC60.

6 FINANCIAL REPORTS

6(a) Status of Refundable Balance

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

6.2 The 57th session of Council (Antigua and Barbuda, 2017) approved a new basis for apportioning the amount refunded by the UK Department of Transport which became effective from 2018. Under this new method non-BCT Members were refunded the full amount included in their annual contribution to the CMO, while the five BCT Members bear the percentage (27%) that was not refunded.

6.3 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.

6.4 Apportionment of any refund received from the British Government was based on the assumption that all Member States are meeting their annual contributions to CMO on a regular basis. In reality, however, some Member States were in arrears of contributions to the CMO Headquarters. Therefore, although the Refundable Balance reports the amount available to the Member State, access to draw-down was linked to their financial status with the Organization and may be restricted.

6.5 The 59th session of the Council (Anguilla, 2019) requested the CMO Headquarters Unit present three proposals for objectively quantifying the refundable balance available to Member States that were in arrears at the next meeting. The 60th session of the Council (2020) approved the third proposal which was presented.

6.6 In keeping with a decision made during the 47th session of the Council (St Vincent and the Grenadines, 2007), each session of the Council is provided with both the current status of the Refundable Balances held at the CMO Headquarters on behalf of CMO Member States, as well as, the amount available for draw-down by each Member State.

6.7 The current status of the Refundable Balances held at the CMO Headquarters on behalf of CMO Member States at 15 October 2021, as well as, the financial status of these Members and the amount available for drawdown based on the decision taken at CMC60, is shown below:

BRITISH CARIBBEAN TERRITORIES	TTD	USD * BALANCE	USD AVAILABLE FOR USE	FINANCIAL STATUS	COMMENT	DATE OF LAST PAYMENT
Anguilla	143,784	21,147	21,147	In Arrears	2021 O/S	Sep-21
BVI	119,766	17,614	17,614	In Arrears	2020 and 2021 O/S	Feb-20
Cayman Islands	-	-	-	Current	Current	Jun-21
Montserrat	84,801	12,472	12,472	Current	Current	Jan-21
Turks and Caicos Islands	220,018	32,359	32,359	Current	Current	Sep-21
	568,369	**83,592**	**83,592**			
CMO MEMBERS OF WMO						
Antigua & Barbuda	22,949	3,375	-	In Arrears	2020 and 2021 O/S and 10 years (2010 - 2019) short payments	Nov-19
Barbados	55,517	8,165	8,165	Current	Current	Sep-21
Belize	555	82	82	In Arrears	2020 and 2021 O/S	Oct-19
Dominica	21,272	3,129	905	In Arrears	2021 O/S and 13 years (2002-2014) non payment	Jan-21
Guyana	12,026	1,769	1,769	Current	Current	Jun-21
Jamaica	246,643	36,275	36,275	In Arrears	2021 O/S	Feb-20
Saint Lucia	20,342	2,992	2,992	In Arrears	2021 O/S	Jun-20
Trinidad and Tobago	8,487	1,248	1,248	In Arrears	2021 O/S	Aug-21
	387,791	**57,035**	**51,436**			
TOTAL	**956,160**	**140,627**	**135,028**			

* USD equivalent calculated at prevailing rate of exchange at 15 October 2021

6.7 **The Council**

Noted the status of the Refundable Balances Account based on the decision taken at CMC60 with respect to availability of funds for drawdown by Members States in arrears of contribution to the CMO Headquarters.

6(b) CMO HQ - Auditor's Report

6.8 The financial statements of the CMO HQ are normally audited about the middle of every year by the Auditor General's Department of Trinidad and Tobago. The audit of the financial statement for fiscal 2019 and 2020 were completed in the fourth quarter of 2020 and 2021, respectively, due to challenges associated with the global COVID-19 pandemic.

6.9 **The Council**

(i) **Reviewed** and accepted the audited financial statements for 2020
(ii) **Reaffirmed** the continued use of the Auditor General's Department of Trinidad and Tobago for the provision of audit services for the Headquarters of the CMO as provided by the Government of Trinidad and Tobago for the audit in 2022;
(iii) **Approved** the request of the CMO HQ to explore the possibility of changing its auditors.

6(c)-1 CMO HQ - Statement of Contributions and Arrears

6.10 The *Caribbean Meteorological Counc*il (CMC), as the Governing Body of the Caribbean Meteorological Organization (CMO), is responsible for approving the budgets of both organs of the CMO, namely the *Headquarters Unit* (CMO HQ) and the *Caribbean Institute for Meteorology and Hydrology* (CIMH). Once approved, it is hoped that all Member States would honour their commitment to meet their annual contributions towards these budgets in a timely manner.

6.11 There has been a persistent shortfall of contributions remitted to the CMO HQ annually which, prior to 2020, averaged 25% of the approved budget. In 2020, this shortfall *almost doubled to 47%* as only eight Members States made their full contribution, which accounted for 53% of the total assigned contributions for 2020. Prior to the widespread impact of the COVID-19 pandemic in the region, one Member State liquidated 85% of its arrears outstanding at the start of 2020, which helped to offset the impact of reduced contributions received for 2020, as shown in Table 1 below.

TABLE 1: SUMMARY OF CONTRIBUTIONS RECEIVED FROM 2016 TO 2021

[TABLE REDACTED]

6.12 In 2021 the shortfall in collections, as at 15th October 2021, has jumped to 70% as only six Member States had made their full contribution to the CMO HQ, which represented only 30% of the approved budget for 2021. Three Member States cleared their arrears for 2020 in 2021, which liquidated 38% of the arrears outstanding at the start of the year while 10 Member States made no contribution towards the approved budget of the CMO HQ for 2021 as shown in Table 1.

6.13 Short payment and non-payment of contributions by Member States may delay the implementation of activities planned for the CMO HQ which were aimed at strengthening the resilience of Member States to the socio-economic impacts of environmental factors.

6.14 The recent increase in the annual shortfall of contributions collected has made it imperative that the availability of funds to meet any temporary deficit in cash flow be addressed in the absence of overdraft facilities with the banks.

6.15 **The Council**

Examined and **discussed** the detailed Statement of Contributions and Arrears to the CMO Headquarters at 15 October 2021.

6(c)-2 CIMH - Statement of Contributions and Arrears

6.16 The Council was provided with a report from the CIMH on the subvention which were received as at 30th September 2021, the end of its reporting period. CIMH received 52% of its approved Estimates of Expenditure by 30th September. For the same period in 2020 only 30% of contributions were received.

6.17 It was noted that CIMH continues to provide full service to all Member States regardless of the position of their indebtedness to the Institute. However, the non-payment of subventions and arrears limits the ability CIMH to service their needs as well as the need of the international community.

6.18 **The Council**

(i) **Continues to Note** the negative impacts that poor funding can have on activities that were critical to the sustainable development of Member States;
(ii) **Discussed** on how to have the debts settled.

7 CMO BUDGETS (HEADQUARTERS UNIT, CRN AND RADAR, CIMH)

7(a) CMO HQ - Estimates of Expenditure for 2022

7.1 Budget estimates of the operating costs for the CMO Headquarters Unit (CMO HQ) and contributions to the Caribbean Rawinsonde and Radar Networks (CRN) for 2022 were presented to the Council for examination and approval.

7.2 The 2022 budget proposal for the CMO HQ did not factor any change in the rates of exchange used in previous years since, in keeping with the decision of Council at CMC55 (Belize 2015) invoices are now issued in USD, therefore any change in the rate of exchange will have an offsetting effect on both income and expenditure in local currency.

7.3 The total estimate for 2022, is TTD X,XXX,XXX, or the equivalent of USD XXX,XXX. This is an increase of TTD XXX,XXX, or the equivalent of USD XXX,XXX, representing an overall increase of 19.5% over the approved budget for 2021.

7.4 Closed borders, travel restrictions and other lockdowns imposed due to the COVID-19 pandemic drove innovation and increased use of technology to achieve objectives. This led to significant savings in 2020 as confirmed by the audited financial statements of the CMO HQ for income year 2020 (CMC61 Doc.6b). A proposal to utilise the savings in 2020 to offer a rebate to Member States was presented to Council for approval.

7.5 **The Council**

(i) **Approved** the budget of **TTD X,XXX,XXX.XX** or the equivalent of **USD XXX,XXX.XX** as detailed in **ANNEX III**, with Member contributions as indicated in **ANNEX IV**;

(ii) **Approved** the three-month period of overlap between the incumbent Science and Technology Officer and the Science and Technology Officer-Designate to ensure a smooth transition for the Organization;

(iii) **Approved** a rebate of **TTD XXX,XXX.XX** from unspent funds approved for 2020 which should be assigned to Member States on the same basis as the current contribution formula effective in 2020. The rebate may be utilised in 2022 by those Member States that have already met the full contribution for 2020. Members in arrears may only utilise the rebate upon liquidating the contributions due for 2020.

(iv) **Urged** Members to give priority to meeting annual contributions on a more timely basis, and to make every effort to liquidate arrears to the Organization;

(v) **Reminded** Members that when forwarding their contributions to CMO Headquarters by bank transfers, to deposit funds into the account noted on the invoice;

(vi) **Also Urged** Members to inform the CMO Headquarters of their transfer of funds, including the date, amount and currency, in order to address difficulties in properly identifying the origin of funds within the banking system.

7(b) CIMH - Estimates of Expenditure for 2022

7.6 The Estimates of Expenditure of the Caribbean Institute for Meteorology and Hydrology (CIMH) for Fiscal Year 2022 (FY2022) were presented for examination and approval by the Council after a detailed consideration by the Board of Governors (BoG) of the CIMH. The estimates cover the finances required to allow the Institute to effectively fulfill its mandate to the region. Significant reductions to the Institute's Estimates of Expenditure may negatively impact planned and ongoing activities.

7.7 The Estimates for 2022 show an increase of 7.4 % relative to the Estimates approved for fiscal 2021. The total expected expenditure for fiscal 2022 is BBD X,XXX,XXX or USD X,XXX,XXX. The US equivalent was also presented in keeping with the request of the 55th Session of Council requested that invoices for contributions by Member States be sent only in United States dollars

7.8 **The Council**

(i) **Approved** the budget of **BBD X,XXX,XXX.XX,** equivalent to **USD X,XXX,XXX.XX**;

(ii) **Urged** Members to give priority to meeting annual contributions, as well as liquidating any arrears of contribution due to the CIMH;

(iii) **Also Urged** Members to inform the CIMH of their transfers of funds, including the amount and date.

8 SPECIAL CMO AND OTHER WMO ISSUES

8(a) Arrangements for Meteorological Forecast and Warning Services among CMO Member States

8.1 The Council held an extensive discussion on the modification of the agreements for forecast and warning responsibilities of National Meteorological and Hydrometeorological Services (NMHS) of the CMO Member States in the north-eastern Caribbean. It recalled that when the CMO was established in 1973 to replace the Caribbean Meteorological Service (CMS) after the breakup of the West Indies Federation, there were several National Meteorological Services operating observing stations and a few Forecast and Warning Offices. In the process, the Council set in place a set of forecast and warning responsibilities, in which the larger NMHSs provide weather forecast and warning services for neighbouring smaller Services. These arrangements have been modified by the Caribbean Meteorological Council over the years. The 50th session of the Council re-formalized the forecast and warning arrangements. The 51st session of the Council reiterated Resolution 2 of the 50th Session of Council and reconsolidated the interface between its own arrangements and those of the WMO-led Regional Hurricane Operational Plan. Resolution 1 taken at the 51st Council replaced Resolution 2 of the 50th Council, which is no longer in effect.

8.2 The CMO Member States with ***Weather Forecast and Warning Offices*** are Antigua and Barbuda, Barbados, Belize, Cayman Islands, Grenada, Guyana, Jamaica, Saint Lucia, and Trinidad and Tobago. The Member States with ***Aeronautical Meteorological Offices*** are Anguilla, British

Virgin Islands, Dominica, Montserrat, St. Kitts/Nevis, St. Vincent and the Grenadines, and the Turks and Caicos Islands.

8.3 Presently, the forecast and warning responsibilities of CMO Member States are the following:

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

8.4 Questions arose in 2020 about the provision of forecast and warning services by the Antigua and Barbuda Meteorological Services (ABMS) to the four neighbouring Member States and the increasing resources required from ABMS to meet increasing service demands and whether there was a mechanism for cost recovery for the services provided to neighbouring Member States. The Coordinating Director and the Principal of CIMH were asked by the Member States receiving services to advise on the matter.

8.5 Council was advised that formalities involved in the provision of meteorological services for aviation in British Overseas Territories requires a resolution of the matter by the 61st Council, as these territories will be subject to an ICAO audit in 2022. Since the forecasting and warning arrangements were agreed to by the Council, the Council was asked to review, and modify, if necessary, the arrangements.

8.6 Council was also informed that Barbados, Dominica, St Vincent and the Grenadines have been in a period of transition of their forecasting arrangements. While Barbados continued to provide daily forecasts, local forecasters in the receiving countries conduct their local briefings and make adjustments of the forecast during the day as needed; with Barbados on standby to support, as necessary. The current test phase started in 2020 with guidance from CMO Headquarters.

8.7 Council was reminded that revision of regional arrangements has implications beyond the Antigua and Barbuda Meteorological Service and the Barbados Meteorological Service and the Member States to whom they provide forecast and warnings. Other CMO Members have been receiving forecasts and warnings from non-CMO Members. The CMO Headquarters has been advising those CMO Member States on developing the capacity to deliver those services locally.

For example, the CMO Headquarters has been supporting the St Kitts Meteorological Service on the transition of Terminal Aerodrome Forecasts to local forecasters. Currently, Terminal Aerodrome Forecasts for St Kitts are provided by the US Weather Service Office in San Juan.

8.8 The Observer from the **Bahamas Department of Meteorology** informed Council of the current situation in the Bahamas, where the government was considering a proposal from a private entity to take over the aeronautical meteorological service for the Bahamas. He encouraged the CMO to resolve these matters quickly, because if the proposal was accepted, it will affect the Letter of Agreement between the Bahamas Department of Meteorology and the Turks and Caicos Islands Airport Authority for forecasts and warnings.

8.9 After a long period of deliberation on cost-recovery and capacity development in Member States that receive forecast and warning services, Council decided to form a sub-committee to review the arrangements and report to Council with advice on a decision. The Committee will include delegates from Guyana, Belize, and Jamaica (the Jamaican delegate cited Jamaica's experience of having had responsibility for forecast and warnings for the Cayman Islands, which then developed its own Weather Forecast and Warning Office). Other members of the committee will be the lead delegate for CDEMA, who shared their experience with their regional response mechanism and prioritizing of sub-regional focal points for warehousing that incur costs; representatives from the providers and receivers of forecast and warnings; the Principal of CIMH; and the Coordinating Director of CMO Headquarters. The Coordinating Director suggested that the committee's work should be completed before the scheduled UK audit by ICAO.

8.10 **The Council**

(i) **Agreed** to form a committee to review and discuss cost recovery as a part of regional forecasting arrangements and **make a recommendation** to the Council.

(ii) **Directed** the committee to provide Council with a report before scheduled UK audits by the ICAO

8(b) WMO Regional Concept and Approaches

8.11 The Council was reminded that in the 18th WMO Congress (June 2019) indicated that **priority should be placed on increasing regional capability**, which is outlined under WMO *Long-term Goal 4* and its associated Strategic Objectives for 2020-2023. Coordination among WMO bodies is needed to ensure that they are supporting, systematically and seamlessly, the **full value chain of systems and services to support Members**.

8.12 ***President, Evan Thompson*** *(*Jamaica*)* of ***WMO Regional Association IV*** (RA IV, North America, Central America, and the Caribbean) presented the regional priorities for 2020-2023 and the revised working structures of RA IV. The revision was in alignment with the decisions of the *18th Congress* and *72nd Executive Council* (EC-72) regarding governance reform.

8.13 The RA IV President updated the Council on the RA IV priorities, namely, Global Framework for Climate Services (GFCS), Disaster Risk Reduction (DRR), Water (Hydrology), Seamless and Integrated Prediction Services (GDPFS). He also outlines important or ongoing regional activities for the Caribbean, including Aviation Meteorological Services; Implementation of WIGOS & WIS; Maritime Meteorology. These activities were mapped to the WMO Long-term Goals.

8.14 The new RA IV working structures, which were approved at the ***18th Session of RA IV*** held in 8-11 February 2021, include regional bodies and focal points that reflect the WMO subsidiary bodies. The RA IV Management Group selected the Chairs and Co-Chairs from among experts that were nominated by Members of RA IV, to conduct the tasks of the regional work programme.

8.15 The Council commended the CMO experts, who were selected to serve as Chairs and Vice Chairs of the *RA IV Infrastructure Committee* and *Services Committee*; Chairs and members of the Expert Teams of the two Committees, andthe Focal Point. Members States of the CMO were **urged** to nominate experts for the RA IV Committees, based on their relevant expertise within the Member State and reminded that nominations are not restricted to the National Meteorological Services. Experts serve in their personal capacity for the benefit of the entire RA IV.

8.16 The Council was also briefed on the regional approaches and the benefits to CMO by the WMO RA IV Sub-regional Office Representative, ***Mr Rodney Martinez Guingla***. He spoke of ongoing activities and strategic goals to improve support to President of RA IV and Permanent Representatives with WMO; improve technical support to NMHS; improve communication within the Regional Association; Improve visibility of NMHS; Improve support on Resource Mobilization. He noted the plans for more frequent virtual coordination meetings; Focused technical webinars in according to regional priorities; and joint technical and coordination webinars with regional partners. He cited the CMO-WMO Lightning symposium and follow-up activity as examples of successful joint technical and coordination. Mr Martinez also noted the importance of increased communication with the political level and partners in a language that was not for meteorologists (high-level events).

8 B(1) OTHER HIGHLIGHTS OF WMO *EXTRAORDINARY CONGRESS* 2021

8.17 The Council was informed of the WMO *Country Hydromet Diagnostics* for peer-evaluation, a standardized, integrated and operational way of benchmarking National Meteorological Services, their operating environment, and their contribution to high-quality weather, climate, hydrological, and environmental information services, and warnings. The Diagnostics evaluation is intended to help guide development partners in the Alliance for Hydrometeorology in implementing capacity development investment. The Country Hydromet Diagnostic was “road-tested” in 16 WMO Member States during 2020-2021.

8.18 The Council noted that the WMO response to global crises was also considered by the Extraordinary Congress — with the WMO Subsidiary bodies being requested to lead development of processes and guidance for Members on ways to maintain the operational systems and sustain the continuity and quality performance of the essential services

8(c) Outcomes/Highlights of 73rd and 74th Sessions of the WMO Executive Council

8.19 Council noted that the Coordinating Director, *Dr Arlene Laing*, an elected Member of the Executive Council, led a strong delegation to the 73rd Executive Council on 14-25 June, comprising *Dr. David Farrell*, Principal of the CIMH, *Mr Glendell De Souza* of the CMO Headquarters, and *Dr Garvin Cummings* of Guyana. The involvement of this team, along with President of RA IV, *Mr Evan Thompson*, increased the regional input to the session and facilitated the critical follow-up actions to prepare our region for the Extraordinary Congress. Council also noted that *Dr Arlene Laing* has been a Member of the Committee for the WMO Research Award for Young Scientists since 2019. Council was asked to encourage nominations of young Caribbean scientists to help advance and promote regional research and development.

8.20 At the 74th Executive Council, the Coordinating Director was asked to serve on the *EC Task Force on the Evaluation of the WMO Reform*; a Task Force chaired by the President of the WMO. She was accompanied to the Session by Mr De Souza.

8(d) WMO Integrated Global Observing System – Initial Operational Phase

8.21 The Council recalled that for the last several years, significant discussions have been held on the *WMO Integrated Global Observing System* (WIGOS). WIGOS is an all-encompassing approach to the improvement and evolution of WMO's global observing systems, which was needed in all countries to consolidate progress in meteorological research, numerical modelling, and computer and communication technologies. Closely tied to WIGOS was the implementation of the *WMO Information System* (WIS). WIGOS, together with WIS, form the basis for the provision of **accurate, reliable and timely weather, climate, water and related environmental observations and products** by all Members and WMO Programmes, which would lead to improved service delivery. Both WIGOS and WIS are very essential to all technical and scientific activities of Meteorological Services in the Caribbean and worldwide.

8.22 The Council noted that WIGOS became operational in 2020 and that, as with all Member States of WMO, CMO Member States should be in full preparation for implementation. The goal was for all Member States and their partners to benefit from a fully operational system. Council noted that the focus was on getting the Meteorological and Hydrometeorological Services of CMO Member States ready in the first instance, while efforts continue to bring partner institutions and organizations on board as contributors to WIGOS.

8.23 As decided by the 73rd WMO Executive Council, Member States are to adopt the updated *Guide to the WMO Integrated Global Observing System* (WMO-No. 1165), with effect from 1st October 2021. WMO recognized that significant capability gaps and other challenges remain. Those would need to be addressed during the strategic period 2020-2023, in order for the system to fully serve all WMO application areas and help Members exploit the full potential of partnership agreements. The highest priorities for WIGOS during this period would be:

1) National WIGOS implementation, including necessary capacity development, partnership agreements and integration of observing systems for all application areas;
2) Fostering a culture of **compliance** with the WIGOS technical regulations;
3) Implementation of the Global Basic Observing Network (GBON) and the Regional Basic Observing Networks (RBON);
4) Operational deployment of the WIGOS Data Quality Monitoring System (WDQMS);
5) Operational implementation of Regional WIGOS Centres (RWC);
6) Further development of the Observing Systems Capability Analysis and Review (OSCAR) databases.

8.24 Council was reminded that National Meteorological Services (NMS) are required to develop a **National WIGOS Implementation Plan** (N-WIP)—to describe how the NMS would partner with other national entities to create a comprehensive strategy for the implementation of a national observing system, to collect, manage and store meteorological, hydrological, and other relevant data. Council noted that the CMO Headquarters provided NMSs with a self-assessment template for the identification of gaps in their observing systems and examples of completed assessment to assist in the completion of their assessment. Further, NMSs of Members States that were not Members of WMO were provided with a form for the input of their data, which was required for the updating of their observational metadata which is stored on the WMO metadata database called Observing Systems Capability Analysis and Review (OSCAR)/Surface. The updating of the database was a requirement of establishing their N-WIP. Council **urged Member States to support their NMS in the development of a National WIGOS Implementation Plan** by facilitating and enabling the necessary data policies and partnerships to integrate information about data related to weather, climate, and water and the environment.

8.25 The Council recalled discussions of the concept of *Regional WIGOS Centres* (RWCs), as a vital part of the implementation of WIGOS. RWCs provide regional coordination, technical guidance, assistance and advice to Members and partner organizations through regional WIGOS performance monitoring and incident management. A Virtual ***Regional WIGOS Centre*** in Regional Association IV (North America, Central America and the Caribbean) (RA IV), was proposed, as a collaborative effort of the United States National Weather Service, Environment Canada, the CMO Headquarters Unit, and the Trinidad and Tobago Meteorological Service, and endorsed by the RA IV Management Group in January 2020. The RWC functions are to monitor and evaluate the availability, timeliness, and quality of observation data, where the CMO HQ and TTMS would cover the English-speaking Caribbean. A workshop on Regional WIGOS Centres was held for RA IV on 8-9 December 2020. The RWC working group was currently developing an implementation plan.

8 (e) The Global Framework for Climate Services (GFCS)

8.26 Council recalled 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 at national, regional, and global levels. Via Resolution 20 (Cg18), the governing structure for the GFCS was changed to the *Climate Coordination Panel* (CCP) which reports to the WMO Executive Council. The CCP includes the following: (i) Subgroup on the WMO contribution to the GFCS, (ii) Subgroup on climate policy and (iii) GFCS Partners Advisory Committee (PAC), the mechanism for stakeholder engagement in GFCS.

8.27 The priority areas for the GFCS are (i) agriculture and food security (ii) disaster risk reduction, (iii) energy (iv) health and (v) water. Implementation of the GFCS was through eight (8) global projects, many with an emphasis on developing countries and Small Island Developing States. In this regard, several of the GFCS Projects involve the CIMH, which was implementing the five GFCS pillars plus other sectors of importance, such as tourism, at the regional level. One such project is the *ACP-EU Climate Services and Related Applications* (ClimSA) that the CIMH was implementing on behalf of the CMO. That project would benefit a number of CMO Member States through the development of National Frameworks for Climate Services. The CMO Headquarters was supporting the CIMH in this project.

8.28 The Council also recalled that, through a WMO-CMO Implementing Arrangement, *National Frameworks for Weather, Water, and Climate Services* and *complementary Action Plans* are included in newly developed *Strategic Plans* for the National Meteorological and Hydrometeorological Services of eight beneficiary CMO Member States. The strategic periods are 2021 to 2025, except for Guyana, which was 2022 to 2026. Implementation of this project was supported by CIMH to ensure compatibility and complementarity in Member States in which they are developing national framework for climate services.

8 (f) Issues emerging from WMO Technical Commissions and Research Board in 2021

8.29 The Council noted that Part II of the First Session of the ***Commission for Weather, Climate, Water and related Environmental Services and Applications*** (Services Commission, SERCOM-1 (II)) was held during 22-26 February 2021. The Coordinating Director, *Dr Arlene Laing*, led the British Caribbean Territories (BCT) delegation, which included *Mr Glendell De Souza*, *Mr John Tibbetts* (Cayman Islands), *Mr Adrian Trotman, Ms Kathy-Ann Caesar,* and *Dr Cedric Van MeerBeeck* (CIMH). SERCOM-1 initially focused on establishing its working structures and their Terms of Reference and development of a Workplan. CMO experts in SERCOM are listed in CMC61, Doc 8.

8.30 The decisions of SERCOM of interest to CMO Members were shared with the Council, namely:

- Resolution 6 - Decides to approve the publication of the additional chapters as *WMO Guidelines on Multi-hazard Impact-based Forecast and Warning Services – Part II: Putting Multi-hazard IBFWS into Practice* (WMO-No. 1150);
- Resolution 7 - Decides to promote the use of Common Alerting Protocol (CAP) in public alerting for hydrological hazards;
- Resolution 8 - Decides to adopt the concept note for the establishment of WMO Hydrological Centres in the Global Data-Processing and Forecasting System;
- Resolution 9 – Decides to endorse the final draft of the *Guidelines on Seasonal Hydrological Prediction;*
- Resolution 12 - Requests the joint WMO–WHO Study Group on Integrated Health Services to explore the strengthening of the links with the Global Heat Health Information Network (GHHIN), to promote the implementation of integrated climate health services in coordination with GHHIN, and to consider the future recommendations of GHHIN with respect to stronger integrated applied science and scale-up of heat–health warning systems in coordination with the Study Group on Integrated Urban Services, Standing Committee on Climate Services, Standing Committee on Services for Disaster Risk Reduction and Public Services, and other relevant bodies;

8.31 The Council was informed that *Dr Arlene Laing* and *Mr Glendell De Souza* represented the British Caribbean Territories (BCT) in Part III of the First session of the ***Commission for Observation, Infrastructure and Information Systems*** (INFCOM-1) on 12-16 April 2021. After lengthy discussion, the session approved the draft resolution for the Unified Data Policy, which was later approved by the Congress; draft amendments to the WMO *Technical Regulations, Volume I - General Meteorological Standards and Recommended Practices* (WMO-No. 49); Part I - WIGOS, and the *Manual on the WMO Integrated Global Observing System* (WMO-No. 1160). INFCOM-1 also decided to establish an INFCOM Gender Balance Focal Point with the collaboration and support of the INFCOM Management Group, and in close consultation with the SERCOM Gender Focal Point.

8.32 The Council was informed of the ***new Climate Normals for 1991-2020***, recommended for collection and publication by INFCOM. CMO Headquarters facilitated the participation of National Meteorological Services in WMO Training on *Climatological Standard Normals*. National Meteorological Services of CMO Members States are **urged** to:

1) Start calculating and publishing 1991-2020 Climatological Standard Normals nationally as soon as possible with the aim of completion of the Global climate normals (CLINO) (WMO-No. 847), ideally not later than end of 2023;
2) Launch a broad communication campaign to promote the updated Climatological Standard Normals and to clearly communicate Normals' update implications to NMHS internal and external users as well as the general public;
3) Contribute to the WMO collection of Climatological Standard Normals 1991-2020.

8.33 The Council was asked to note that the ***WMO Research Board*** (RB) met by videoconference on 28-29 January 2021 to discuss and review membership of the Research Board, WMO Research Programme activities, the status of RB Concept Notes on research goals, and an *Open Science Conference on the Earth System* being planned for 2025. Research Board Management meetings were held on 1st June and 6th October 2021. Council was reminded that the Coordinating Director, *Dr Arlene Laing*, is a member of the WMO Research Board representing RA IV (North America, Central America, and the Caribbean).

8.34 The Council was asked to note that the ***Research Board*** has developed Concept Notes that articulate high-level scientific priorities and key activities needed in a manner that was attractive and

accessible to the broad scientific community and to partners who were not familiar with WMO, including funding agencies and stakeholders; facilitate interactions within WMO; enable the research programmes to work more effectively on cross-cutting aspects; and provide an inclusive framework for partners of WMO. The *Science for Services* Concept was the overarching umbrella for the other concept notes. Council noted that *Dr Arlene Laing* led the Concept Note on "*Innovation in Regions*". During 2021, Concept Notes on "*Exascale Computing and Data Handing and Artificial Intelligence"* and a "*Hydrology Research Strategy for the WMO*" were drafted.

8.35 The Council recalled the WMO's support for the global water agenda (presented under Agenda Item 3). The Research Board agreed that the Hydrology drafting team, in collaboration with the Secretariat, would coordinate the draft Research Strategy on hydrology for the WMO with inputs from the three WMO Research Programme Chairs, other leading and representing key constituencies within the WMO, IAHS, and UNESCO as well as critical stakeholder groups.

8.36 The Council noted that, in response to the COVID pandemic and the questions about seasonal and environmental impacts, the WMO Research Board convened a ***Task Team, WMO SARS-CoV-2/COVID-19 TT*.** The Task Team responded to the real-time challenge of providing decision support and relevant knowledge on climate-weather-air pollution drivers and determinants of the SARS-CoV-2/COVID-19 pandemic. The Task Team published their report and a journal article and hosted a roundtable on *COVID-19 Seasonality: current understanding and relevance to decision-making* in September 2021.

8 (g) Disaster Risk Reduction and Regional Severe Weather Forecasts and Warning Systems

TROPICAL CYCLONE PROGRAMME

8.37 Council recognized that activities within the WMO *Tropical Cyclone Programme* (TCP) were among the most important to the Caribbean and other tropical basins, with the most critical regional activity being the WMO *Hurricane Committee*, serving the *North Atlantic and Caribbean Basin*. The Hurricane Committee has at its core, *the US National Hurricane Center*, which was one of WMO's primary *Regional Specialized Meteorological Centres* (RSMCs) for tropical cyclones. Most Meteorological Services in CMO Member States are 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.

8.38 Council noted that the ***43rd Hurricane Committee*** met via videoconference, on 15-17 March 2021 (Part I) , and 4-5 May 2021 (Part II). Part I was a review of the record-breaking 2020 Hurricane Season and its impacts, which had the additional challenges presented by the COVID-19 pandemic. Cape Verde, previously an observer, became a new Member of the Hurricane Committee. The Operational Plan was updated for 2021.

8.39 The Council noted the forecast successes, challenges, and statistics of the record-breaking 2020 season, presented by Mr Dan Brown, RSMC/NHC, including:

- 30 named storms, 13 hurricanes (6 major), 639 forecast advisories issued by the RSMC (average is 322), 22 of the 30 storms had watches or warnings for land areas or made landfall, 25 total landfalls (five hurricane landfalls in the Caribbean, two Category 4 landfalls in Nicaragua, two weeks and 15 miles apart), subtropical storm landfall in Portugal, direct impacts in nearly every country in the Atlantic basin, 11 landfalls in the United States (4 in Louisiana, eight along the Gulf Coast), two storms prior to 1 June, the sixth straight year with at least one pre-season storm

- Some progress was noted in forecasts of intensity and rapid-intensification and coordination within the Region was deemed as outstanding despite staffing challenges and restrictions due to COVID-19

8.40 During Part II of the Hurricane Committee, the Technical Plan was updated. Information was provided on programmatic elements, such as the upper air observation network and training. High-resolution storm surge modeling developed through the Coastal Inundation Forecast Initiative (CIFI), operational in Dominican Republic and Haiti in 2019, was expanded to the Yucatan and Belize and would next be implemented in the Bahamas, in collaboration with the USAID and National Weather Service (NWS) International Affairs. Scientific lectures were presented on *Multi-radar Multi-Sensor* (MRMS) mosaic products for hurricane applications; changes in hurricane risk in Bermuda; and Hurricane Education and Technology Development in COMET.

8.41 Council was alerted to the adverse prospect of geohazards being compounded by a forecasted active hurricane season and the ongoing COVID-19 pandemic, was at the fore-front of discussions during Part II of the 43rd Hurricane Committee Session. With the explosive eruptions of La Soufrière on the island of St Vincent, which began on 9 April 2021, and its related hazards being aggravated by floods, RSMC forecasters agreed to, where possible, to extend lead times for warnings on heavy rainfall, which triggers lahars and other volcanic hazards.

8.42 Council noted that, for the first time, the Hurricane Committee featured a special session on Social Science aspects of hurricanes. *Dr Katy Sherman-Morris*, Mississippi State University, spoke on hurricane risk perception and the influence of the characteristics of the individual; the characteristics of the event; and the presentation of information. *Dr Alexis Lorenzo Ruiz, Cuba,* presented, “Psychological and social aspects in meteorological disasters: a Cuban experience”, health programmes, with specialized medical attention that fully incorporated psychological care alongside a multidisciplinary approach for crisis intervention. *Ms Sally Edwards and Mr Leonardo Hernández*, WHO/PAHO, spoke on decision making influencers (e.g., missing or incomplete information, urgent deadlines, limited emotional resources, lack of sleep, etc.) and the need for those at risk to be extremely well prepared. She described a Health Sector Multi-Hazard response framework as the capacity of countries to manage their response to emergencies and disasters in a more efficient and timely manner. *Dr Gina Eosco* and *Ms Jennifer Sprague-Hildebrand* presented preliminary findings from the Hurricane Supplemental Social and Behavioural Science Projects in the US National Weather Service. These included, how the public consumes and processes changing tropical cyclone forecasts over time; assessing numeracy skills of forecasters, partners, and the general public to improve TC product uncertainty communication. *Ms Lina Sjaavik*, WMO, presented the CREWS Caribbean initiative to support LDCs and SIDS to increase the capacity to generate and communicate effective, impact-based, multi-hazard, gender-informed early warnings.

8.43 Council further noted a special session on making the linkages: discussion about the multiple hazards and the linkages needed for effective response, organized by the CREWS Caribbean and the Coordinating Director. *Ms Donna Pierre*, WMO, presented the CREWS Caribbean May 2020 workshop on linkages between Impact-based forecasting (IBF) and Risk Scenario Planning (RSP) and the role of gender. *Dr Arlene Laing*, presented on regional and national coordination on multi-hazard early warning system (MHEWS); applied to the eruption of La Soufrière volcano on St. Vincent, focusing on the Meteorological Service of St Vincent and Grenadines and the Barbados Meteorological Service; and assistance from NOAA/NESDIS with GOES mesoscale rapid-scan. *Dr David Farrell*, CIMH, spoke of the pre-eruption, eruption and post eruption activities by a range of national, regional and international organizations in response to the evolving multi-hazard challenge, complicated by COVID-19 pandemic. Dr Farrell described the CIMH volcanic ash and gas atmospheric transportation modeling used to support Saint Vincent emergency management, with model runs performed daily using a predefined set of eruption parameters. He also spoke on the

impacts of the eruption on the energy sector, the environment, including water quality, and the economy.

8.44 Council noted a major decision by the 43rd Hurricane Committee to discontinue use of the Greek alphabet in favour of a supplemental name list to be used when a seasonal name list is exhausted. The record-breaking numbers of hurricanes in 2020, led to the use of the Greek alphabet, which had last happened in 2005. In 2020, two category 4 hurricanes which devastated Central America, were named for Greek letters, Eta and Iota. Those names were retired, along with Dorian (2019), and Laura (2020).

8.45 Council was also informed that Coordinating Director supported the Principal of the CIMH, to facilitate the entry of the "Hurricane Hunter" aircraft and crew into Barbados during the 2021 hurricane season. Information was also provided to CIMH to support the Honourable Prime Minister of Barbados in meetings with senior NOAA officials, in particular the benefits of extending the range of the reconnaissance flights farther east of the current limit. The extended range had been requested in previous Hurricane Committee sessions.

8.46 The **Council**:

(i) **Noted** the decisions of the WMO Extraordinary Congress 2021 and the 73rd session of the Executive Council (EC) on regional concepts and approaches of the WMO; and **supported** the work of WMO Regional Association IV;

(ii) **Encouraged** WMO Member States to take advantage of resources available through the Alliance for Hydromet Development

(iii) **Noted** the activities of the WMO Commissions and Research Board

(iv) **Urged** WMO Members to nominate experts to RA IV subsidiary bodies and the WMO Expert database to expand Member participation in WMO constituent bodies.

(v) **Urged** CMO Member States to ensure that their NMHSs complete activities for the Operational Phase of WIGOS, which began in 2020;

(vi) **Noted** the activities on the proposed Virtual *Regional WIGOS Centre* (RWC) as a collaboration among the US, Canada, CMO Headquarters and the Trinidad and Tobago Meteorological Service;

(vii) **Continued** its strong support for the *Global Framework for Climate Services* and to **urge** Member States to actively participate in GFCS projects and activities;

(viii) **Noted** and **supported** the important work of the regional Hurricane Committee

9 MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES

9.1 The Caribbean Meteorological Council considered the Report of the Annual Meeting of Directors of Meteorological Services, held on 17 November 2021, presented by *Mr Glendell De Souza*, Science and Technology Officer of the CMO Headquarters. The Report

provided the Council with a 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 two items were drawn to the attention of Council.

1. **Status of Actions from the Previous Meeting**

One of the actions which required Meteorological Services of Member States to complete by 5th November 2020 was for the Services to begin transmission of all aeronautical observations, forecasts, significant weather alerts, forecasts and volcanic ash advisories in ICAO Meteorological Information Exchange Model (IWXXM) format. This was requirement of the International Civil Aviation Organization (ICAO) and it has implications on international air transport within the Caribbean. The Director of the Barbados Meteorological Service and the Science and Technology Officer would work together to develop an application which can be used the Meteorological Services of CMO Member States to meet this requirement.

2. **Operational Matters**

Retirement of the Annual Integrated World Weather Watch Monitoring: - As a consequence of the suspension of the operation of the Integrated World Weather Watch Monitoring (IWM) and the adoption of the *WMO Integrated Global Observing System* (WIGOS) Data Quality Monitoring System as the operational replacement, Meteorological Services must ensure that they become compliant with WIGOS requirements, which are:

(a) The completion of the National WIGOS Implementation Plan (N-WIP)
(b) OSCAR/Surface: completed WIGOS metadata of all observing stations across all WIGOS components for which observations are exchanged internationally;
(c) WIGOS metadata: compliance achieved;
(d) WIGOS Station Identifiers: implemented;
(e) WIGOS Data Quality Monitoring System (WDQMS): national process for acting on quality problem information received from the WDQMS in place

Providing Impact-based Forecast and Warning Services through the Common Alerting Protocol (CAP) standard: - The 18th Session of WMO Regional Association IV (North America, Central America and the Caribbean) (8-11 February 2021), the Regional Association:

(1) Endorsed the implementation of Impact-based Forecast and Warning Services (IBFWS) by Members through formal engagement with Disaster Management and Civil Protection Authorities (DMCPAs) and other stakeholders;
(2) Adopted the CAP standard for the dissemination of warnings to the stakeholders, as a significant step in the implementation of the Global Multi-hazard Alert System (GMAS) framework in the Region;

Through the Climate Risk and Early Warnings Systems (CREWS) Caribbean Project, a consultant was engaged and this is being managed by CDEMA to determine what are the frameworks guiding operational arrangements between NMHSs and NDOs. This is being piloted in Antigua and Barbuda, the Bahamas, Barbados, and Trinidad and Tobago.

9.2 **The Council**

(i) **Reviewed** and **amended** the Draft DMS2021 Report as necessary;
(ii) **Noted** that human resources would be needed to have National Meteorological Services compliant in encoding and decoding meteorological information in the ICAO Meteorological Information Exchange Model (IWXXM) format;
(iii) **Noted** that human and financial resources would be needed to have National Meteorological Services and National Disaster Offices implement Impact-based Forecast and Warning Services.

10 CMO WEATHER RADAR NETWORK

OPERATIONAL STATUS

10.1 The Council recalled that the CMO Weather Radar Network currently comprised of 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 For most of 2021, the radars in Barbados, Belize, Cayman, and Guyana were operating steadily. The easternmost of the radars, in Barbados, had returned to operations in late 2020, after a prolonged period of outage. After functioning without issues for several years, the radar in Trinidad developed problems in February 2020 and several replacement parts were ordered later that year, including one part that has a 9-month delivery schedule. Arrangements were made for a maintenance visit to Trinidad by the radar manufacturer. The radar in Belize returned to full functionality after replacement of four parts. On 24 May 2021, amidst several days of significant amounts of rainfall, an electrical event knocked out Guyana's National Weather Watch Center power, internet, and telephone lines and the weather radar stopped working the next day. Fortuitously, Guyana had already scheduled a maintenance visit for June and with the technical assistance of the manufacturer, the radar was back in operation three weeks later. Cayman Islands radar had an outage on 21 October 2021 and was still offline during the Council session, due to the need to reseal the dome. The CMO Headquarters has been facilitating the purchase of parts using funds available to Members from the CMO Radar and Rawinsonde accounts, when requested.

10.3 In Jamaica, a new dual-polarized, S-band, Doppler radar was installed, in testing phase, then to be commissioned. The new radar was installed at the same site as the previous Doppler radar and is expected to be in operations in 2022. The radar project was funded by the World Bank project for Improving Climate Data and Information Management, under the Pilot Program for Climate Resilience (PPCR). The old radar was made available for research to The University of the West Indies (Mona) Department of Physics in Jamaica.

10.4 A Geo-Information Centre (GIC) was being implemented in Saint Lucia by agreement between the Government of Saint Lucia and the Government of Italy. The GIC installations were being implemented by the Caribbean Community Centre for Climate Change (5Cs). The project included the installation of an X-band radar, which has a radius of 120 km and was to be cited within line of sight of the Hewanorra Airport in Vieux Fort, Saint Lucia.

10.5 A suitable location to site the radar has been provided by the Government of Saint Lucia. The civil works carried out to date, included; (i) construction of an access road, (ii) building of a one-room structure and platform to house the radar and accompanying equipment. The radar equipment was in storage at the Ministry of Infrastructure, Ports, Energy and Labour storeroom, with installation of the radar scheduled to be completed by the end of November 2021. The training on the use of the radar was conducted virtually and further training would occur after the installation was completed.

OPERATIONS OF THE REGIONAL RADAR COMPOSITE AND OTHER REGIONAL AND INTERNATIONAL OBLIGATIONS

10.6 The session once again discussed and **urged** display of radar data on the websites of the National Meteorological Services, including data from the radar composite image developed by the Barbados Meteorological Service. The wider use of weather radar data by national television media was also ***encouraged***.

10.7 Council recalled that there were two regional radar composites in operation. The first was the composite system generated at the French Meteorological Service (Météo-France) Centre in Martinique, which was developed through an agreement between Météo-France and the CMO. The Météo-France composite normally includes radars from the Cayman Islands, Jamaica, Guadeloupe, Martinique, Barbados, Trinidad, Guyana and French Guiana. The second composite was developed separately by the Barbados Meteorological Service. From a practical point-of-view, the Barbados-generated composite was more widely used composite regionally, including by the US National Hurricane Center in Miami and other Caribbean States.

10.8 Radar composites are a regional priority under the *WMO Integrated Global Observing System* (WIGOS). The CMO Headquarters has been asked several times by the WMO Region IV management and by the WMO WIGOS Project Office in Geneva about the sustainability of the Barbados-generated composite, since WIGOS was now in its operational phase in 2020. As discussed during the last few Council sessions, the Barbados composite was not yet the subject of a formal arrangement or long-term commitment by Barbados, which was necessary for it to be part of WIGOS. The CMO Headquarters believes that this excellent effort by the Barbados Meteorological Service should have firm national commitment and become an official service provided by Barbados.

10.9 Council noted the importance placed by the US National Hurricane Center in Miami on the imagery, both individually and as a composite, from the weather radars in CMO Member States. The National Hurricane Center indicated that radar data from the Caribbean and neighbouring areas were extremely important in determining the evolution of the several tropical storms and hurricanes that moved across this region and also allowed them to provide additional position updates as the cyclones approached land. The National Hurricane Center encouraged the Meteorological Services to continue to make radar imagery from the region available operationally via operational telecommunication systems or via the Internet.

10.10 Council was reminded that the full volume radar data from the Cayman Islands and Belize were assimilated into the numerical weather models of the *NOAA/National Centers for Environmental Prediction* (NCEP), through participation in the NOAA *Multi-Radar Multi-Sensor* (MRMS). This program benefits the region by improving the initial conditions in the NCEP models, such as the Global Forecast Systems (GFS) model, which have been utilized by many Meteorological Services. MRMS develops specific products for transportation, hydrometeorology, and severe weather. The original data received from individual radars was not shared outside of NOAA/NCEP. The CMO HQ were working with the MRMS project leaders to identify other potential collaborators as well as a mechanism by which CMO Member Services could receive training on the use of MRMS products in operations

10.11 Through the CREWS Caribbean Project implementation, the CMO Headquarters has been coordinating the development of a Gridded Precipitation dataset comprised of radar, rain gauges, and satellite-estimated precipitation. The project was implemented by the World Bank, through a contract with the Centro Internazionale in Monitoraggio Ambientale (CIMA) Foundation. The resulting dataset, being prototyped over the Eastern Caribbean, was expected to be a valuable regional resource for early warning systems, climate monitoring, risk analysis for flooding, and water resource management.

10.12 Council was reminded that the CMO Radar Network has considerable potential for climate risk analysis and other scientific applications. Approaches for better utilizing of Caribbean radars and archived data, including setting up easy access to the full data archives; more usage would increase benefit to the region. For example, an archive of high-resolution radar rainfall estimates was valuable for understanding rainfall variability on the scale of small watersheds and provides improved flash flood guidance and knowledge of climatological extremes. Due to climate change,

the Caribbean was expected to experience high variability in precipitation and radar information would offer guidance on the "new normal" for setting infrastructure standards and other necessary adaptation. An archived dataset with the combined point accuracy of rain gauge data and the superior resolution of the full radar data would be a valuable regional resource.

10.13 Council also noted that additional weather radars were expected be installed by other regional States over the next few years that would increase the coverage over some parts of the region and provide coverage in areas not currently covered by radars. One such example was the radar network in the Bahamas that was implemented in 2019, which, when completed will cover the entire Archipelago, as well as portions of the Turks and Caicos Islands. Further, there were discussions in the Turks and Caicos Islands on the procurement of a joint radar facility between the Department of Disaster Management and Emergencies and the Turks and Caicos Airport Authority; to be compatible with being part of the Bahamas mosaic. The CMO Headquarters was asked to provide advice on the project.

10.14 Council recalled that at the 59th Council Session it approved the Terms of Reference for a *CMO Operational Radar Group*. The first workshop that CMO Headquarters organized for 11-12 May 2020 was cancelled due to the pandemic. It would be rescheduled for 2022. The **Observer, Bahamas Department of Meteorology** indicated an interest in the sharing of knowledge and expertise with the CMO Operational Radar Group.

UPGRADING CMO RADARS TO DUAL POLARIZATION

10.15 The Council was informed that the majority of radars being installed were equipped with dual-polarization capability, i.e., having both horizontally and vertically polarized beams. Dual-polarization was now the operational standard in the US National Weather Service, after a series of upgrades. Indeed, the Cayman Islands radar, installed in 2013, has dual-polarization and the new radar installed in Jamaica was a dual-polarized radar. The advantages of dual-polarization, compared with current weather radars, are:

- the effective removal of non-meteorological echoes, typically called clutter;
- significantly better quantitative rainfall estimates;
- the differentiation between very heavy rain and hail, which will improve flash flood watches and warning; and
- the potential to increase lead time for flash flood hazard warnings, because of greater confidence in dual-polarimetric radar data

10.16 It was recalled that the CMO Headquarters received Council's support to pursue funding for a capital project, with internationally-funded and tendered process, to obtain the necessary equipment to upgrade the CMO radars to dual polarization. To that end, the Headquarters Unit began discussions with the Caribbean Development Bank in 2020 about pursuing international climate grant financing. As a precursor to that activity, the CMO Headquarters was coordinating with the World Bank CREWS Caribbean Project on a review of the CMO Radar Network. The CMO Science and Technology Officer (STO) was scheduled to work with the World Bank consultant on the study. The consultant's visit to Trinidad and Tobago was scheduled to coincide with the first workshop of the Operational Radar Working Group. Both activities were postponed due to the pandemic. The findings of the review would inform a proposal being drafted to seek funds to upgrade the CMO radars to dual polarization.

10.17 It was noted that the Government of Barbados has approved the upgrading of the Barbados radar to dual polarization; scheduled for 2022. The Barbados Meteorological Service would be making spare parts from the current radar available to other Member States at a reduced price.

REPAIR RESPONSE AND RADAR SPARE PARTS

10.18 The Council was reminded that the CMO radars were now past ten years since installation and are increasingly malfunctioning, creating gaps in the regional warning system, hence there need for more consistent maintenance and repairs of the radars, than was originally agreed at the outset of the CMO radar project. Local meteorological services cannot always affect rapid repairs due to budget constraints, the sometimes-high cost of parts, and the unpredictability of failures. The CMO Radar and Rawinsonde funds provides some support and the Operational Radar Working Group would aid in meeting some of the maintenance needs. These efforts do not always solve the need for having a more rapid response to unforeseen problems and the need for a larger spare parts repository. Setting up a fund and system for managing rapid repairs could eliminate many months of down time. Some funding could be negotiated in exchange for data access; akin to the approach of National Meteorological Services in other regions

10.19 **The Council**

(i) **Noted** the status of the weather radars in the CMO Member States; including a new radars installed in 2021.

(ii) Reiterated its call for the Meteorological Service operating radars to fully publicize their websites; for all Services to provide a link on their websites to relevant radars and composite loops, and to work towards the greater use of live radar data by regional television stations;

(iii) **Urged** Barbados to make a formal long-term commitment to the regional radar composite that it developed and to ensure its availability for contribution to the regional components of the *WMO Integrated Global Observing System* (WIGOS);

(iv) **Encouraged** the Meteorological Service operating radars to participate in the NCEP Multi-Radar Multi-Sensor (MRMS) activities for the benefit of the region and the wider meteorological community;

(v) **Noted** the development of a prototype multi-sensor gridded precipitation product with radar data as the primary data source.

(vi) **Encouraged** the archiving and access to the full set of radar data for flash flood guidance, climate services, and other scientific applications;

(vii) **Discussed** and **provided** guidance on the matters related to upgrading the weather radars;

11 OTHER PROJECT UPDATES AND PROPOSALS

11(a) WMO Severe Weather Forecasting Programme (SWFP)

11.1. Council recognized the need to improve the early weather warning system, particularly for episodes of severe weather that may not be the result of a tropical cyclone and could occur at any time of year. In November 2015, Council endorsed a proposal by CMO and partners to implement a WMO *Severe Weather Forecast 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 what has been designated by the 18th WMO Congress as the ***Severe Weather Forecasting Programme*** (SWFP) - Eastern Caribbean (SWFP-EC). The WMO Secretariat, *Météo-France*, the CMO Headquarters, and the CIMH, have been collaborating to develop the SWFP-EC into an operational programme.

11.2. The Regional WMO Management structure established the *Regional Sub-programme Management Team* (RSMT) for the development and implementation of the SWFP. The Coordinating Director co-chairs the RSMT with an expert from France. Other CMO representatives on the RSMT include Ms Kathy-Ann Caesar of the CIMH and Mr Dale Destin, Director (Ag) of the Antigua and Barbuda Meteorological Service. It was recalled that the WMO Severe Weather Forecasting Programme was being developed along the following lines:

(i) The SWFP would cover all the islands from Trinidad in the south to Puerto Rico in the North, to Dominican Republic and Haiti in the West;

(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 SWFP.

11.3. Council recalled that the SWFP implementation in the Eastern Caribbean was made possible by seed funding from Canada through its CREWS (Climate Risk and Early Warning Systems) Project. The SWFP was being developed in four phases: 1) Overall Planning; 2) Implementation plan development and execution; 3) Demonstration and 4) Operational (no longer a project). Phase 3 and 4 include capacity building through training of meteorologists, public weather service focal points, and the media.

11.4. Council was informed that the SWFP-EC is now in its pre-operational Demonstration phase, initiated in 2019, with global and regional model forecast guidance being used to monitor potential severe weather by the *Regional Forecast Support Facility* (RFSF–Martinique). All National Meteorological Services in the project domain have access to the Extranet of the RFSF, which became operational, 24/7, in 2019.

11.5. Council noted that in February 2021, the *Management Team* met virtually to examine progress made at the *Regional Forecast Support Facility* (Météo-France Martinique), including the Extranet, new data/product for sharing, to produce severe weather guidance, and to ensure real-time coordination.

11.6. Council also noted the CMO Headquarters solicited funding from the US National Weather Service International Affairs (NWS-IA) to support the SWFP training goals. The NWS-IA generously supported nine forecasters from CMO Member States to attend the American Meteorological Society (AMS) Short Course on *GOES-R/JPSS Hands-on Training to Process, Display, and Analyze Satellite Data Products*, held on 17-18 March 2021

11.7. Council further noted that the Coordinating Director, *Dr Arlene Laing*, and *Mr Jean-Noel Degrace* of Météo-France reported to the *43rd Hurricane Committee* on recent activities of the SWFP-EC, including (i) new products available for forecasting severe weather, such as forecast soundings for each regional airport; (ii) a summary of training activities led by CIMH; (iii) postponement of forecaster exchange due to the pandemic; (iv) the development of an operational plan for severe weather; and (v) the coordination with related projects that are being implemented in the Caribbean, including the International Weather Ready Nations (WRN), Flash Flood Guidance System (FFGS), and Coastal Inundation and Forecast Initiative (CIFI).

11.8. Council was informed that 20 forecasters were trained during a *Severe Weather Forecasting Programme-Eastern Caribbean & Hurricane Forecaster Competency Virtual Workshop* for 8-12 November 2021, led by *Ms Kathy-Ann Caesar (CIMH*), in collaboration with Météo-France, CMO Headquarters, the US National Hurricane Center, and the University of Leeds.

11.9. Council was pleased to learn that CMO Headquarters hosted an intern, *Ms Vikki Lee*, supported by the CCRIF-SPC (Caribbean Catastrophic Risk Insurance Facility) internship programme. Ms Lee developed a draft *Severe Weather Operational Plan*, modelled after the WMO

RA IV Hurricane Operational Plan. The intern presented an overview of the draft Operational Plan at the Severe Weather Forecasting Programme-Eastern Caribbean & Hurricane Forecaster Competency Virtual Workshop. The full draft plan was scheduled to be presented to the Management Team at its next meeting (tentatively planned for December 2021).

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

11(b) CREWS Caribbean: *Strengthening Hydro-Meteorological and Early Warning Services in the Caribbean*

11.11. Council recalled the presentations from Council Sessions since 2018 about the *Climate Risk and Early Warning System* (CREWS) Caribbean Project, co-funded by the CREWS Initiative, and *Environment and Climate Change Canada* (ECCC). The aim of the CREWS-Caribbean project was 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 in CARICOM countries.

11.12. The implementing partners are the WMO, the *Global Facility for Disaster Reduction and Recovery* (GFDRR), the *United Nations Office for Disaster Risk Reduction* (UNDRR), and the *World Bank Group* (WBG). The primary regional implementing partners were the Caribbean Disaster and Emergency Management Agency (CDEMA), CIMH, and CMO Headquarters Unit. The Project has three components: Component (1) - Development of regional strategy for EWS; Component (2) - Institutional Strengthening and streamlining of early warning and hydro-meteorological services; and Component (3) - Support for Piloting High Priority National Activities.

11.13. In 2020, CMO Headquarters and the WMO signed an Implementing Arrangement for the partial delivery of CREWS-Caribbean Project Component (2) with a project entitled, *Building Resilience to High-Impact Hydro-meteorological Events through Strengthening MHEWS in Small Island Developing States (SIDS) in the Caribbean*. The project has been supporting the following activities implemented by the CMO HQ, with funding of $263,000 USD.

11.14. Meteorological Legislation: Model Meteorological Bill and Policy for National Meteorological Services in the English-speaking CARICOM Member States, were developed by a legal consultant and endorsed by CMO Member States on 2 June 2021. CMO HQ implemented the project with strong support by the Organization of Eastern Caribbean States (OECS). Reviews of the model legislation were provided by CMO Member States, CMO HQ, the OECS Legal Unit, WMO), and CARICOM Office of General Counsel. The following documents were also provided through the project: Meteorology Policy Assessment and Appraisal Report, Meteorology Legislative Assessment Report, Meteorological Bill Explanatory Note, and Draft Cabinet Note. The adaptation to national circumstance and submission of two national Meteorological Bills to relevant national agency to enable enacting was included in the original project. In June, the CMO HQ asked to reallocate unused travel funds towards the submission of meteorological legislation in six additional Member States and the WMO and CMO amended the Implementing Arrangement. An amended contract was signed with the legal consultant to adapt the Model Meteorological Legislation for six more national meteorological bills, with December 2021 as the end date.

11.15. National Strategic Plans and Framework for Weather, Water, and Climate Services: - The CMO HQ implemented a project that developed Strategic Plans, Framework for Weather, Water, and Climate Services and complementary Action Plan for National Meteorological and Hydrological Services of eight CMO Member States that requested assistance. The consultant was tasked with "*The development and endorsement of Strategic Plans (SPs) for the National Meteorological and*

Hydrological Services, a Framework for Weather, Water, and Climate Services (FWCS) and a complementary Action Plan for the countries: Anguilla, Antigua and Barbuda, Dominica, Grenada, Guyana, Jamaica, St. Kitts and Nevis, St Vincent and the Grenadines using the WMO National Strategic Plan Template and Guide."

11.16. The Strategic plans were developed following several months of consultation with NMHSs and their stakeholders, organized by the *National Focal Points*. National consultation workshops included the CMO Headquarters Unit, WMO Office for Regional Association IV, and CIMH, in its capacity as a WMO Regional Climate Centre. The implementation was coordinated with CIMH, which has been piloting National Frameworks for Climate Services in some CMO Member States, and this project, which encompasses weather, water, and climate services, was aligned with CIMH projects to enhance and develop climate services at the national level. With a National Framework for Weather, Water, and Climate Services, each country was expected to be better equipped to manage disasters, agriculture and food security, water resources, transportation safety, public health, renewable energy, marine services, tourism, etc. Along with the CMO Headquarters Unit, *Mr Adrian Trotman* and *Dr Roché Mahon* of CIMH provided recommended revisions for all draft Strategic Plans. Seven beneficiary Member States Directors formally accepted receipt of the Plans in a meeting held with the WMO, the CREWS Secretariat, and CIMH on 11th August 2021. Thereafter, final review and revisions were completed and submission of the finalized Strategic Plans were made to the Directors of the National Meteorological Services in September and October. As of 22th October 2021, one of the beneficiary States had not yet formally acknowledged receipt of their Strategic Plan.

11.17. Council noted that the Strategic Plans of two of the Member States are already being utilized in their national development plans. All beneficiary Member States are **urged** to endorse and launch the Strategic Plans for the strengthening of weather, water, and climate services at the national level.

11.18. Council noted that four priority activities were proposed under Component (3) of the CREWS Caribbean Project to be implemented by various regional organizations including CIMH, CDEMA, CMO Headquarters, Météo-France, Caribbean Telecommunication Union (CTU), among others:

- Priority activity 1: Development of a Multi-sensor Precipitation Grid
- Priority activity 2: Support the Transition to Impact-Based Forecasting
- Priority activity 3: Development of a Regional Emergency Alert System
- Priority activity 4: Integrated Approach to Flooding (under discussion)

CMO Headquarters contributed to the development of the *Strategic Roadmap for Advancing Multi-Hazard Early Warning Systems in the Caribbean 2020-2030* and would contribute to the Priority Activities.

11.19. Council was informed that CMO Headquarters is leading the coordination of Priority Activity 1, the development of a multi-sensor precipitation grid over the Eastern Caribbean. The prototype precipitation grid would have the Barbados weather radar a primary data source. The project has been implemented by the World Bank, through a contract with the Centro Internazionale in Monitoraggio Ambientale (CIMA) Foundation. The project includes CIMH, as the technical lead, and the National Meteorological Services of Barbados, Saint Lucia, and St Vincent and the Grenadines. The goal is to to prepare a regional precipitation grid that will integrate radar and satellite derived rainfall estimates, calibrated with locally observed rain gauge data. The precipitation grid would be shared among participating countries and used to drive forecasting systems such as the Flash Flood Guidance System (FFGS) and be useful to disaster management, water resources managers, agriculture, energy and other sectors that increasingly demand more accurate and timely access to

rainfall information. Since there was benefit to the entire region, it was hoped that countries would be willing to participate so that the grid may be incrementally extended as benefits are shown.

11(c) EUREC^{4}A-UK-CMO Caribbean Weather Forecasting Initiative

11.20. Council recalled that the University of Leeds and CMO Headquarters, implemented a *Caribbean Weather Forecasting Initiative* in support of *EUREC^{4}A-ATOMIC*, an international field study led by institutions from France, Germany along with the CIMH. The Forecasting Initiative was supported by a grant from the Natural Environment Research Council (NERC), United Kingdom, and the WMO Climate Risk and Early Warning Systems (CREWS) Caribbean Project. The project was partially funded through an agreement between WMO and CMO Headquarters Unit, as it supported the Severe Weather Forecasting Programme (SWFP) in the Eastern Caribbean by developing collaboration practice among regional forecasters and helping forecasters to understand the strengths and limitations of high-resolution weather prediction model.

11.21. Council noted the benefits of the Initiative to the National Meteorological Services of CMO Member States**,** whose forecasters gained enhanced capability in numerical weather prediction, understanding dry season weather and localized storms, through training workshops and a forecast "test-bed". The lessons learned the *EUREC^{4}A* Forecast Testbed and subsequent research analysis meetings with *EUREC^{4}A*-UK collaborations were shared in the *Severe Weather Forecasting and Hurricane Forecaster Competency Workshop*, 8-12 November 2021. This workshop was hosted by CIMH, with support from Météo-France, CMO Headquarters, the US National Hurricane Center, and University of Leeds. A follow-up *EUREC^{4}A Caribbean Weather Forecasting Initiative* workshop has been postponed to 2022 due to the pandemic. Due to in-person workshop being postponed for yet another year, the WMO recommended that the remaining funds be returned and a new agreement developed to organize the workshop in 2022

11(d) Caribbean Hydro-Meteorology Symposium 2020

11.22. Council recalled that Directors of NMHSs expressed a desire for a second symposium following the successful first symposium that the CMO Headquarters Unit co-organized with a focus on aiding Directors of NMHSs to find share ideas and seek solutions to operational hydro-meteorology challenges in the Caribbean. The 2019 symposium focused on data issues and public-private-academic partnerships. The focus of the 2020 symposium, held on 15-17 December 2020, was on:

(i) Integration of operational hydrology and meteorology in terms of the Caribbean context and how to develop a roadmap for hydrological activities
(ii) Partnerships among public sector, private sector, academia, and inter-governmental bodies to collaborate on strengthening Hydro-Meteorological infrastructure, data sharing, products, and services to meet growing societal demand

11.23. The 2020 Symposium featured key international speakers, including opening remarks by *Dr David Farrell*, Principal of CIMH, and a keynote speech by *Dr Garvin Cummings*, Chief Hydrometeorologist, Guyana Hydrometeorological Service, the only fully-integrated hydrometeorological service among CMO Member States. Critical outcomes from the WMO *RA IV Hydrological Advisors Forum* were shared by *Dr Hwirin Kim*, Head, WMO Hydrological Forecasting and Water Resources Services Division. Other key presentations were on funding mechanism for the development of National Hydrological and Meteorological Services, such as the *Green Climate Fund,* facilitated by the *Caribbean Community Climate Change Centre* (5Cs) or the *Caribbean Development Bank*.

11.24. Council noted CMO facilitation of interaction with hydrology. *Mr Massimiliano Lombardo*, UNESCO Cluster Office for the Caribbean, chaired a panel of national hydrological agencies on the challenges and opportunities for floods and drought management in the Caribbean, from the perspective of the *UNESCO Intergovernmental Hydrological Programme* (IHP). UNESCO IHP, which describes itself as "devoted to water research and management, and related education and capacity development", is a core partner of WMO, which traditionally focuses on operational hydrology. Real-time monitoring and prediction of water was featured in other presentations. Relationships among symposium participants were initiated and enhanced during roundtable discussions on topics such as "Advancing partnerships between meteorological and hydrological agencies in the Caribbean"; "Progress in data capture and sharing"; "Defining and growing stakeholder services"; and "The move to early warning systems and impact-based forecasting.

11.25. Council noted actions by the CMO Headquarters following the hydro-meteorology symposium. The CMO Headquarters and CMO Member States provided input to the WMO Plan of Action for Hydrology. The Coordinating Director participated and encouraged Member States to participate in the information session on hydrology held on 31st August 2021 and in the Hydrological Assembly of the WMO Extraordinary Congress 2021. CMO Headquarters also planned to participate in the upcoming virtual Hydromet Symposium for the Americas on 5-7 December 2021.

11(e) Lightning Detection System and Lightning Safety Awareness

11.26. Council recalled that, 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 studied this system and was of the opinion that such a system was very necessary in the Caribbean. At the 59th Session (Anguilla, 2019), Council approved the initiation of a project to develop a *CMO Lightning Detection Network*.

11.27. Council noted that over the years, the CMO Headquarters has received proposals from a number of lightning-detection suppliers. The CMO Headquarters proposed that the Council 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.

11.28. The 57th session of the Council (2017) discussed the matter and 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 and 2019 prior to deciding on the CLDN. Studies conducted over North America that compared the GLM with the Vaisala's National Lightning Detection Network and Earth Networks Total Lightning Network, provided guidance for how to proceed. For operational forecasting, it is best to have lightning observations from both the GLM and a ground-based network of sensors. The GLM provides high quality observations over data sparse regions (e.g., the ocean) and while ground-based networks are excellent at locating cloud-to-ground flash strikes. Some Member States, such as Belize and Jamaica, have begun setting up sensors, which could become part of a regional network.

11.29. Council recognized the importance of lightning safety awareness. In 2020, Jamaica experienced lightning deaths; in 2019, several footballers were injured by lightning during inter-secondary school matches; and in 2017, flights were grounded when lightning struck the Jamaica Civil Aviation Authority's Air Traffic Control Facility at the international airport in Kingston.

11.30. With the aim of improving lightning safety, the CMO Headquarters and the WMO hosted the first ever ***Symposium on Lightning and Lightning Safety Awareness*** from 19-20 May 2021, on a virtual platform. With over 130 international participants from 28 countries, several prominent international presenters spoke on lightning safety, lightning injuries, public education and communications, engineering, lightning detection, lightning protection, lightning applications in weather forecasting, and lightning as an essential climate variable. Participants included stakeholders from aviation, health, sports, energy, agriculture, and other sectors. Following the symposium, the Coordinating Director authored an article about the symposium in *Meteoworld*, https://public.wmo.int/en/resources/meteoworld/symposium-lightning-and-lightning-safety-awareness. The Coordinating Director also met with ***Mr Rodney Martinez Guingla***, WMO Representative for RA IV, and ***Dr Jorge Tamayo***, Coordinator of the *Conference of Ibero-American National Meteorological and Hydrological Services* (CIHMET), to learn more about the implementation of a lightning detection network in Central America, which became operational in 2019. It is hoped that lessons learned could be applied to developing a network for the Caribbean.

11.31. Council noted that following the successful lightning symposium, the Coordinating Director was invited to present at the *International Lightning Safety Day Preparation Conference*, on 28 May 2021. On International Lightning Safety Day, 28 June, the CMO Headquarters distributed a Press Release with lightning safety tips that were broadcast by regional media. These lightning safety awareness activities were timely, as on 17th June 2021, Barbados experienced a record number of lightning strikes, where the numbers of strikes in a few hours were similar to the total number received over the previous four years combined.

11.32. The Coordinating Director was invited to present on Caribbean efforts regarding lightning detection, safety, and awareness during a session on *Lightning and Wildfires* at the *Regional Platform on Disaster Risk Reduction*, 1-4 November 2021. The presentation emphasized that lightning risk management should be part of the disaster risk reduction framework and proposed the formation of an ad-hoc regional group that would join with the international group on lightning safety and promote lightning research and applications in our region.

11.33. **The Council:**

(i) **Noted** the progress made towards the WMO *Severe Weather Forecasting Programme* (SWFP) in the Eastern Caribbean and **strongly supported** regional participation in its implementation;

(ii) **Also Noted** and **strongly supported** developments regarding the CREWS-Caribbean project to strengthen the National Meteorological and Hydrometeorological Services of CMO Member States through the development of Model Meteorological Legislation and Meteorological Policy and the drafting of national meteorological bills based on the model legislation;

(iii) **Note** the development of National Strategic Plans with National Frameworks for Weather, Water, and Climate and Action Plans for eight beneficiary Member States and to **strongly support** the endorsement and implementation of the Strategic Plans' Frameworks and Action Plans;

(iv) **Further Noted** the planned priority activities under the CREWS Caribbean project including a high-resolution regional precipitation grid to aid decisions by hydro-met sensitive sectors

(v) **Also Noted** the continuation of a collaborative *Caribbean Weather Forecasting Initiative* that advanced forecasting skill and allowed forecasters

from across the region to have knowledge exchange and collaboration on scientific analysis with researchers through an international field study

(vi) **Noted** the successful December 2020 operational hydro-meteorology symposium for Directors of National Meteorological Services and other key stakeholders and subsequent contributions to the global water agenda;

(vii) **Noted** the successful Symposium on Lightning and Lightning Safety Awareness and recent developments in connection with enhancing lightning safety awareness, and **support** the exploration of options for an operational ground-based lightning detection system, and the formation of an ad-hoc regional working group on lightning.

12 OTHER MATTERS

12(a) Renewal of the contract for the Coordinating Director

12.1 During an in-camera session, Council discussed the renewal of the CMO Headquarters Coordinating Director's contract for another three-year term. The renewal had been approved by a round robin decision of Member States that participated in the 60th Council.

12.2 **The Council:**

Ratified the renewal of the contract for the Coordinating Director of the Headquarters Unit, which was approved by the 60th Caribbean Meteorological Council, and **authorized** the Secretary-General of CARICOM to issue a new three-year contract under the normal conditions of the post, with an effective start date of 1 June 2021.

12(b) Human Resources Committee

12.3 The Council discussed the matter of retroactive payments in relations to the CIMH Principal's terms of employment in an in-camera session. Council recalled that at the 60th Session of the Council, the Human Resources (HR) Committee was directed by the Council to (i) seek professional advice in the accounting field on the particular methodology to be used to determine the payment amounts; (ii) re-negotiate with the Principal; and (iii) submit a revised proposal to Council on the matter.

12.4 The update from the HR Committee was presented by *Mr Shakeer Baig* (Trinidad and Tobago) as the Chair of the HR Committee, *PS Deborah Payne* (Barbados), was new to the position and had yet not received a briefing on this matter from her predecessor. It was reported to Council that three recommended options were presented to the HR Committee by a chartered accountant who had been contracted by CIMH. The HR Committee decided on the third recommendation, then met with Dr Farrell, and presented their recommendation. The then HR Committee Chair indicated that he needed to consult with the Union that represents staff of The University of the West Indies (UWI) Cave Hill, with an expectation of some recommendation regarding how to move forward with this matter.

12.5 The Principal acknowledged that the Committee made a proposal that was based on the calculation that was done by the auditor and stated that he has rejected the recommended offer by the HR Committee. Of the three positions offered by the auditor, he had indicated his preference. The current Chair of the HR Committee agreed to convene the HR Committee, to understand, and try to resolve the matter as soon as possible. Other members of the HR Committee, PS *Hudson Nedd* (St Vincent and the Grenadines), and *Mr Shakeer Baig*, concurred with the decision of the Chair for the HR Committee to meet and to present a decision for the endorsement of Council.

12.6 **The Council:**

(i) **Directed** the HR Committee to meet by the end of November 2021

(ii) **Decided** that the HR Committee would report to Council at a Special Virtual meeting to be held on 9 December 2021

12(c) Signing of Contracts on behalf of CIMH

12.7 The Principal of CIMH raised the question to Council about the ability of the Principal of the CIMH to sign contracts on behalf of the CIMH. This question arose because the European Union (EU), preferred that their contracts be signed with the CMO. For the CMO, the Council is the final authority for the conclusion of agreements on behalf of the Organization. According to Article 9 in the Agreement for establishment of the CMO, Council may delegate this authority in any particular case. For the EU Intra-ACP ClimSA project, the Chair of the 59th Council delegated Dr Farrell to sign the contract on behalf of CMO. Dr Farrell was seeking a letter or similar documentation that would provide permission for the CIMH Principal to sign projects on behalf of CIMH. Because of the implications for the CMO, Council decided to convene a committee to review the request and make a recommendation to Council.

12.8 It was determined that given the nature of the request that the committee would be comprised of persons with suitable experience in finance and administration. PS *Deborah Payne* (Barbados), Chair of the CIMH Board of Governors, volunteered to lead the committee, with other members being PS *Delma Nedd* (Guyana), and PS *Nicolette Duke* (Trinidad and Tobago).

12.9 **The Council**

(i) **Approved** the formation of a sub-committee, comprising of three Permanent Secretaries, and **directed** the committee to review the request and make a recommendation to Council by 9 December 2021

12(d) Any other business

12.10 The Council bade farewell to ***Mr Hubert Whyte***, Manager of Meteorology, Grenada Meteorological Service, who was scheduled to retire in July 2022 after being in the field of meteorology since 1983. The Council thanked Mr Whyte for his excellent contribution to the CMO and other Member States over the years and wished him well in his retirement. He introduced *Ms Cecil Mitchell*, his understudy during his pre-retirement transition and Council welcomed Ms Mitchell. Mr Whyte indicated his plan to actively participate in the CIMH Alumni Association after retirement. He also recommended a hybrid format for future meetings for ease of participation by Ministers and Permanent Secretaries as this meeting was the highest number of such officials that he had seen participate in a CMC Session.

12.11 Council also lauded ***Mr Glendell De Souza***, Science and Technology Officer, CMO Headquarters, who was scheduled to retire in October 2022. The Council expressed its deep appreciation to Mr De Souza for his 16 years of dedicated and diligent service to the Organs and Member States of the CMO.

12.12 Council congratulated ***Mr Shakeer Baig***, in his new role as Director (Ag) of the Trinidad and Tobago Meteorological Service.

12.13 **The Council**

(i) **Decided** to review and approve the Draft CMC61 report during the Special Session of Council on 9 December 2021

13 DATE AND VENUE OF CMC62 (2022)

13.1 Council invited Member States to indicate their willingness to host the next sessions of the CMC. The Cayman Islands indicated their willingness to host in 2023. Members that have not hosted in recent times were invited to seek authorization to host, and to extend an invitation to the Council for the meetings in 2022.

13.2 **The Council**

(i) **Decided** that nominations for potential hosts of upcoming CMC Sessions and related meetings will be accepted during the Special Session of Council on 9 December 2021.

Close of Meeting

13.3 There being no other business, the Meeting ended at 13:30 AST with an exchange of courtesies.

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A G E N D A - DAY 1

Virtual Session - 9:00 am to 13:00 AST (1300-1700 UTC)

1. OPENING OF SESSION AND ELECTION OF CHAIRMAN

2. ADOPTION OF AGENDA AND PROCEDURAL MATTERS

3. SPECIAL WMO SESSION – Outcomes of the Extraordinary Congress

4. CMO EXECUTIVE REPORTS

    a. Coordinating Director's Report
    b. CIMH Principal's Report
    c. CIMH Board of Governors' Report

5. STATUS OF ACTIONS FROM PREVIOUS SESSION

6. FINANCIAL REPORTS

    a. Status of Refundable Balances
    b. CMO HQ - Auditor's Report
    c. Statement of Contributions and Arrears (CMO HQ & CIMH)

7. CMO BUDGETS (Headquarters Unit, CRN and Radar, CIMH)
    a. CMOHQ Budget Estimates for 2022
    b. CIMH Budget Estimates for 2022

END OF DAY ONE

A G E N D A - DAY 2

Virtual Session - 9:00 am to 13:00 AST (1300-1700 UTC)

8. SPECIAL CMO AND OTHER WMO ISSUES
    a. Arrangements for Meteorological Forecast and Warning Services among CMO Member States
    b. Other outcomes/Highlights of the Extraordinary Session of the World Meteorological Congress 2021, 73rd and 74th Executive Council (EC) Sessions of the WMO
    c. CMO Member States and the WMO Integrated Global Observing System
    d. The Global Framework for Climate Services (GFCS)
    e. Issues emerging from WMO Technical Commission and Research Board sessions in 2021
    f. Tropical Cyclone Programme

9. ANNUAL MEETING OF THE DIRECTORS OF METEOROLOGICAL SERVICES

10. CMO WEATHER RADAR NETWORK

11. OTHER PROJECT UPDATES AND PROPOSALS
    a. Severe Weather Forecast Programme (SWFP)
    b. Climate Risk and Early Warning Systems (CREWS) Caribbean Project
    c. Lightning Detection

12. OTHER MATTERS

13. DATE AND VENUE OF FUTURE CMC SESSIONS

END OF DAY TWO

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ANNUAL MEETING OF THE CARIBBEAN METEOROLOGICAL COUNCIL
VIRTUAL MEETING
18TH-19TH NOVEMBER 2021

CMC61
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REGIONAL CONTRIBUTION TO CMO HEADQUARTERS AND CIMH BUDGETS - 2021

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