



CARIBBEAN METEOROLOGICAL ORGANIZATION

CARIBBEAN METEOROLOGICAL COUNCIL
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SPECIAL WMO SESSION (Submitted by the Coordinating Director)

Introduction

1. This document is to keep the Council informed on the major decisions and actions of the *World Meteorological Organization* (WMO) that are of special interest to the CMO Member States. Some of the decisions of WMO will require decisions or actions by Council to ensure that CMO Member States adhere to commitments and requirements emanating from the decisions of the WMO Congress, the supreme body of the WMO.
2. The **78th Session of the WMO Executive Council** (EC-78) was held on 10 to 14 June 2024 and focused on implementing the priority decisions of the Congress, the **Technical Commissions and Research Board**. The priority areas affect the activities of Member States and their NMHSs in the period 2024-2027, in particular.
3. Council is asked to note the region's role and responses to these major WMO implementation activities, several of which have been addressed by Council over the last few years. They include such priorities as the compulsory implementation of improved observation and information systems, "**Early warnings for all**" per the mandate issued to WMO by the UN Secretary-General, and strengthening the capacity of National Meteorological Services in developing countries. Council is asked to take note of outcomes below, including the important Tropical Cyclone Programme, which is crucial to all Member States of the CMO:
 - (a) Outcomes/Highlights of the 78th Session of the World Meteorological Organization (WMO) Executive Council (EC)
 - (b) Issues emerging from meetings of the WMO Technical Commissions and Research Board in 2024
 - (c) UN Early Warnings for All
 - (d) WMO Integrated Global Observing System, Global Basic Observation Network and Systematic Observation Finance Facility (SOFF)
 - (e) The Global Framework for Climate Services (GFCS) and other Services
 - (f) Disaster Risk Reduction and Regional Severe Weather Forecasts and Warning Systems
 - Tropical Cyclone Programme
 - Severe Weather Forecasting Programme

Preamble: Role and Structure of the WMO

4. The **World Meteorological Organization** (WMO) is the Geneva-based UN-Specialized Agency that is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces, and the resulting distribution of water resources. In other words, "weather, climate, water, and the environment".

5. Because of the very nature of the atmosphere, international cooperation at a global scale is essential for the development of meteorology and operational hydrology down to the national level, for countries to reap the benefits from the global scientific and technical application in these fields. WMO provides the framework for such a unique international cooperation which, as a result, exists among every nation of the world, whether large or small, continental or island, developed or developing. Therefore, the manner in which WMO functions affects the **National Meteorological and Hydrological Service (NMHS)** of every country.

6. Since its establishment in 1950, WMO has played a unique and powerful role in contributing to the safety and welfare of humanity. Under WMO leadership and within the framework of WMO programmes, *National Meteorological and Hydrological Services* contribute substantially to the protection of life and property against natural disasters, to safeguarding the environment and to enhancing the economic and social well-being of all sectors of society in areas such as food security, water resources, transport, and health.

7. The structure of the WMO comprises the **World Meteorological Congress**, the supreme body, an *Executive Council*, six *Regional Associations*, the Geneva-based Secretariat, and the *Commission for Observation, Infrastructure and Information Systems* (Infrastructure Commission, INFCOM), the *Commission for Weather, Climate, Water and Related Environmental Services & Applications* (Services Commission, SERCOM), and a *Research Board*.

8. The WMO **Executive Council** (EC) is the executive body of the Organization, which meets annually, implements decisions of the WMO Congress, coordinates the WMO Programmes, decides on the allocation of budgetary resources, provides guidance and takes action on recommendations of Regional Associations and Technical Commissions and on matters affecting international meteorology and related activities.

A. Outcomes/Highlights of the 78th Session of the WMO Executive Council (EC-78)

9. CMO Headquarters is pleased to report the active participation in the EC-78 of the three CMO experts serving on the WMO Executive Council, **Dr Arlene Laing**, Permanent Representative of the British Caribbean Territories, **Dr Garvin Cummings**, Permanent Representative of Guyana, **Mr Evan Thompson**, Permanent Representative of Jamaica and *President of WMO Regional Association IV*, as an ex-officio member of the Council.

Road Map and Dashboard for Early Warnings for All

10. One of the highlights of the 78th Executive Council was the adoption of a [Road Map for the Early Warnings for All initiative](#), which lays out the vision and actions for enhancing multi-hazard early warning systems (MHEWS), for the period from 2024-2027 and includes detailed dates, deliverables and defined responsibilities.

Drought Management

11. Recognizing the importance of addressing drought in Early Warnings for All and following the recommendation of the Services Commission, EC-78 approved [Resolution 5 – Implementation Plan on National Drought Early Warning Systems](#). The NDEWS has seven objectives are centred around three pillars:

- Drought Monitoring and Early Warning;
- Drought Risk and Impact Assessment;

- Drought Risk Mitigation, Preparedness and Response

12. The Executive Council requested all WMO Members to use the **Standardized Precipitation Index** for classifying meteorological droughts. EC-78 also endorsed the addition of the use of the Standardized Precipitation and Evapotranspiration Index (SPEI), as well as the exploration of the use of the Combined Drought Index (CDI).

Business Continuity Management Guidelines for WMO Members

13. Council will be pleased to learn that the Executive Council endorsed the *Business Continuity Management Guidelines for WMO Members*, as approved and recommended by the Third Session of the WMO Services Commission. The guidelines were developed to ensure preparedness against events that may disrupt operations and services. WMO has formed a *Task Team on the Business Continuity Management* to support National Meteorological and Hydrological Services (NMHS) with implementation. *Mr Haley Anderson*, CMO Headquarters Project Development Officer, began serving as an expert on the Task Team in July 2024.

Climate, Health science and services

14. EC-78 approved the [WHO-WMO 2023–2033 Implementation Plan for Advancing Climate, Environment and Health Science and Services 2023–2033](#), which proposes innovative approaches, sustained mechanisms, and engagement opportunities for better health and well-being for people facing existing and emerging extreme weather events, climate change, and environmental risks.

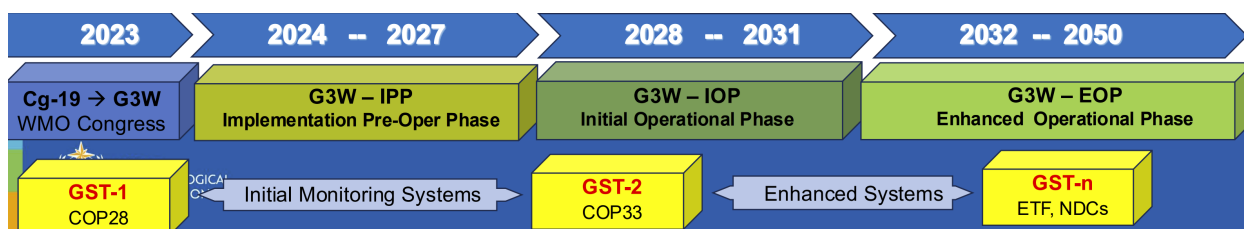
15. The Executive Council decisions were also aimed at strengthening the climate database, which underpins WMO climate services, especially the annual [State of the Climate](#) flagship reports. And modernizing the State of the Climate reporting at global and regional scales.

SIDS and Changes in the Cryosphere

16. Council will recall that Dr Garvin Cummings is serving on the EC Panel on Polar and High Mountains Observations, Research, and Services (PHORS). At EC-78, Dr Cummings gave an innovative [video presentation](#) that voiced the concerns of Guyana and other SIDS in a Side Event entitled, '*Antarctica - a global continent: Towards a WMO Antarctic dialogue*'. EC-78 agreed on actions related to the cryosphere. The Council's attention is warranted because changes in the cryosphere in polar and high mountain areas affect the whole globe, in particular the downstream impacts in small island states and densely populated coastal zones.

Global Greenhouse Gas Watch

17. Council will recall that the 19th *World Meteorological Congress* approved a new [Global Greenhouse Gas Watch](#) (G3W) for systematic monitoring of greenhouse gases to inform implementation of the Paris Agreement on climate change. The [implementation plan of the G3W](#) was approved by the Third Infrastructure Commission in April 2024 and adopted by the WMO Executive Council in June 2024.



18. The new initiative takes advantage of WMO's experience with international cooperation and international data exchange in weather prediction and climate analysis as well as its *Global Atmospheric Watch* and *Integrated Global Greenhouse Gas Information System*, which have been operating since 1989. The proposed components are:

- A comprehensive, sustained, global set of surface-based and satellite-based observations of CO₂, CH₄ and N₂O concentrations, total column amounts, partial column

amounts, vertical profiles, and fluxes and of supporting meteorological, oceanic, and terrestrial variables, internationally exchanged as rapidly as possible

- Prior estimates of the GHG emissions based on activity data and process-based models;
- A set of global high-resolution Earth System models representing GHG cycles;
- Associated with the models, data assimilation systems that optimally combine the observations with model calculations to generate products of higher accuracy.

The monthly flux data can be used for various applications such as the Global Stocktake.

19. Council will recall the *Geneva Declaration* on Public-Private Engagement during the 18th World Meteorological Congress in Geneva, 2019. The WMO EC-78 **endorsed the WMO's [Guidelines for Public-Private Engagement \(2024 edition\)](#)**. Council will be pleased to note that the ***Model Hydro-Meteorological Bill*** for English-speaking CARICOM Members, is included in the **Appendix of the WMO Guidelines for Public-Private Engagement**. The Model Bill and Policy were developed with support of WMO CREWS and endorsed by CMO Members in June 2021.

IMO Prize to Prof Tim Palmer, Pioneer in Ensemble Prediction Methods

20. The 78th Executive Council honoured **Prof. Tim Palmer** as the 68th IMO Prize winner and nominated Prof. Gerhard Adrian as the 69th IMO Prize winner. Prof Tim Palmer was honoured for his role in developing probabilistic ensemble prediction methods for forecasting on all timescales. His work transformed weather and climate prediction and forecast-based action. The citation for his award noted:

“Developing reliable ensembles lies at the heart of many weather service strategic plans. Importantly it is completely transforming the way in which disaster relief agencies operate. Now finance can be provided to regions at risk of extreme weather if the ensemble-based probabilities exceed some pre-determined threshold. This allows these agencies to become proactive, rather than merely wait for the weather event to occur and provide aid retroactively. Improving ensemble systems will be vital to make society more resilient to the new extremes of weather associated brought about by climate change”

21. On the final day of EC-78, the theme for the World Meteorological Day 2025 was adopted: *“Closing the Early Warning Gap Together”*.

B. Issues emerging from meetings of the WMO Technical Commissions and Research Board in 2024

Third Session of the WMO Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications (SERCOM-3)

22. Council is asked to note that the *Third Session of the WMO Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications* (SERCOM-3), was held on 4-9 March 2024, in Bali, Indonesia and in hybrid mode. The meeting was attended by *Dr Arlene Laing*, as the Principal Delegate of the British Caribbean Territories (BCT) delegation, which included *Mr Kenneth Kerr* and *Mr Haley Anderson* (CMO Headquarters), *Dr. David Farrell*, *Ms Kathy Ann Caesar*, *Dr. Cedric Van Meerbeeck* (CIMH). Because SERCOM-3 was held in Bali, Indonesia (AST+12 hours), the BCT delegation participated virtually during the nighttime hours. The [final report of SERCOM-3 was made available in June 2024](#).

23. SERCOM-3 agreed to a number of measures to boost the provision and use of tailored services in the face of rapid climate and societal change to optimize support for key priorities, including ***Early Warnings for All*** and supporting climate adaptation and sustainable development. The Commission approved a **new work programme (2024-2027)** to support the development and implementation of globally harmonized weather, climate, hydrological, ocean, and environment-related services.

24. Council is asked to note that the SERCOM work programme will be providing technical support and services to NMHSs to enhance their capabilities in supporting renewable national energy systems. The Services Commission endorsed a long-term **Capacity Development Plan for WMO Energy Services**. Already, Members have access to a training course and an online learning platform.
25. The Commission also endorsed a set of **good practices for the implementation of integrated urban services** and for assessing their socio-economic and organizational costs and benefits. Integrated urban services are relatively new area of service provision for the NMHSs, with WMO encouraging a **value-driven approach to the development of weather, climate, hydrological, marine, and related environmental services in urban settings**.
26. The new work programme also includes plans to provide hydrological support to the **WMO Flood Forecasting Initiative**, which has as an objective, to improve the capacity of meteorological and hydrological services to jointly deliver timely and more accurate products and services required in flood forecasting and warning and to **strengthen collaboration with disaster managers**, active in flood emergency preparedness and response.
27. The Services Commission recommended the adoption of a minimum set of drought indicators and indices needed for Members to adequately monitor droughts and their associated impacts on agricultural, hydrological, urban, and ecological sectors.
28. Recognizing the importance of including National Drought Early Warning Systems (NDEWS) as a key component for the implementation of the Early Warnings for All Initiative, the Services Commission recommended the **approval of an Implementation Plan on National Drought Early Warning Systems**. The Implementation Plan (IP) includes seven objectives that will be needed for WMO Members to successfully address National Drought Early Warning Systems (NDEWS). These objectives are centred around the three pillars of integrated drought management:
- 1) Drought Monitoring and Early Warning;
 - 2) Drought Risk and Impact Assessment;
 - 3) Drought Risk Mitigation, Preparedness and Response
29. The objectives of the Implementation Plan on NDEWS include:
- a) Establish a methodology to collate national and regional drought monitoring EWS and data-flows that are consistent with WMO standards based on existing infrastructure managed by Members and/or regional centres;
 - b) Develop and strengthen drought monitoring and DEWS capacities of WMO Members through national, regional and global centres;
 - c) Strengthen drought impact collection and drought vulnerability assessments;
 - d) Develop and strengthen drought prediction and verification systems in the context of DEWS, in collaboration with the research and academia communities;
 - e) Increase visibility and use of drought alerts;
 - f) Develop and strengthen national drought action plans, including effective drought mitigation planning, response mechanisms and supporting guidance; and
 - g) Cooperate with Disaster Risk Reduction (DRR) and MHEWS communities on national/regional/global levels.
30. In light of the importance of the safety of lives at sea for the Caribbean, Council is asked to note that SERCOM-3 approved the **Guide to Marine Emergency Response**, which provides meteorologists with clarity on factors affecting Marine Emergency Response (MER) operations, aiding in marine environmental emergency response (MEER) and search and rescue (SAR) operations. SERCOM also Forecasting/Alerting for Coastal Hazards caused by weather driven long waves

Tropical Cyclone Forecasting Competency Framework

31. With tropical cyclones being the most dangerous weather system of the Caribbean, Council is asked to note that SERCOM-3 approved [Decision 6: Tropical Cyclone Forecasting Competency Framework \(TCFCF\)](#), which consolidated the five regional Tropical Cyclone Forecasters (TCF) competencies as a single framework to the [Compendium of WMO Competency Frameworks](#) (WMO-No. 1209) and requested that Members make use of the TCFCF within their regions. There are two levels of TCF competency in TCFCF. The first is for Senior TC Forecasters at Regional Specialized Meteorological Centres (RSMC)/Tropical Cyclone Warning Centres (TCWC). The second, which is relevant to most CMO Member States NMHSs, is for the TC Forecaster working in a forecasting office that receives guidance from an RSMC or TCWC to provide tailored forecasts and warnings for their areas of responsibility.

32. Council is asked to further note a unique RA IV TCF competency, which is a third level of TC competency for non-forecast office personnel. This competency targets preferably a trained forecaster or at least a Meteorological Technician tasked with liaising with the regional forecasting center, who can receive and interpret the watches, warnings, and forecasts, deliver and explain TC information, and can interpret and communicate impact-based hazard information for disaster managers and other local stakeholders. This latter competency is included to satisfy operational practices within less developed CMO Member States Meteorological Offices.

33. **Business Continuity Management Guidelines for WMO Members** is one of the new initiatives approved by SERCOM-3 that is aimed at building resilience in Members. The 78th Executive Council endorsed the Business Continuity Management Guidelines for WMO Members.

34. SERCOM-3 had a special ceremony to present certificates to Members whose experts have been contributing to SERCOM, the following CMO Members were recognized:

- Barbados
- Belize
- British Caribbean Territories (BCT)
- Trinidad and Tobago



35. CMO experts in SERCOM are noted in the list below:

- a) Standing Committee on Services for Aviation (SC-AVI);
Co-Chair, Expert Team: Ms Kathy Ann Caesar/BCT
 - b) Standing Committee on Services for Agriculture (SC-AGR);
Expert Teams: Ms Shontelle Stoute/BCT, Ms Shanea Young/Belize, Ms Arlene Aaron-Morrison/Trinidad & Tobago
 - c) Standing Committee on Climate Services (SC-CLI);
Expert Team: Mr Adrian Trotman/BCT
 - d) Standing Committee on Disaster Risk Reduction and Early Warning Services (SC-DRR);
Expert Team on EWS: Dr David Farrell/BCT
 - e) Study Group on Integrated Health Services (SG-HEA);
Dr Roche Mahon/BCT
- SERCOM Management Group
Mr Evan Thompson, President RA IV/ Jamaica
- National Focal Point for Severe Weather Forecasting Programme

Dr Arlene Laing/BCT
 National Marine Services Focal Point
Mr Dale Destin/Antigua and Barbuda, Ms Carol Surbath-Ali/Trinidad & Tobago, Eron McPherson/Guyana
 National Focal Point for Climate Information Systems
Mr Komalchand Dhiram/Guyana, Mr Kaidar Kissoon, Trinidad & Tobago, Ms Kerrie Forbes/BCT, Ms Annie Carrette Joseph/Dominica

Third Session of the WMO Commission for Observation, Infrastructure, and Information Systems (INFCOM-3)

36. Council is asked to note that the *Third Session of the WMO Commission for Observation, Infrastructure, and Information Systems* (Infrastructure Commission, INFCOM-3), was held on 15 to 19 April 2024, in Geneva Switzerland, in hybrid mode.

37. The BCT delegation to INFCOM-3 comprised *Dr. Arlene Laing* (in-person) and *Mr Kenneth Kerr* (virtual). Other CMO experts in attendance were *Mr Kerry Powery* (Cayman Islands), Chair of WMO RA IV Infrastructure Committee, and *Mr Shakeer Baig*, PR of Trinidad and Tobago with WMO, who served on the Credentials Committee of INFCOM-3.

Protecting Radio Frequencies Vital for Weather, Climate, and Environment

38. Council is reminded that WMO has increased its coordinated efforts to ensure the protection of radio frequency bands that are vital for weather forecasts and life-saving early warnings. Weather forecasts, climate monitoring, and other environmental services all depend on observations and communication in specific radio frequency bands.

39. Council will recall the Coordinating Director's reports to sessions of the Council on its efforts to protect radio frequency since the 60th Council (2020, Virtual, St Vincent and the Grenadines), including appeals to the *Caribbean Telecommunication Union* (CTU) on supporting coordination for promotion of safety.

40. The WMO Infrastructure Commission established national focal points for radio frequency coordination to boost the capacity and knowledge of the Radio Frequency Regulatory framework within the National Meteorological and Hydrological Services and hence enhance the meteorological community's ability to safeguard critical access to the radio spectrum.

41. A current critical issue at the *World Radio Conference 2023* concerns the **measurement of sea surface temperature**, which is essential for the Caribbean severe weather warnings, as tropical storms form when the sea-surface temperature reaches or exceeds 26°C and rapid intensification of storms has been observed over warm currents and eddies. Satellite sensors are the sole means of monitoring the vast oceanic regions where hurricanes form. The 6/7 gigahertz (GHz) frequency range - corresponding to peak SST sensitivity - is required for passive ocean remote sensing from satellites. Studies demonstrated that SST measurements could be severely hindered if International Mobile Telecommunications (IMT) were deployed in these frequency bands.

42. The Coordinating Director was **an invited presenter during INFCOM-3** as a result of the success of the pioneering WMO training workshop hosted by CMO in Port of Spain, in February 2024 in collaboration with the CTU. The workshop increased the capacity of local and regional experts and developed new experts in the field of spectrum management.

43. The Council is reminded that Caribbean decision-makers and regulators need to be well-informed and up-to-date on the value of the spectrum bands for different applications associated with operational weather forecasting, climate and environmental monitoring and research in weather, climate, water, and related environmental sciences.

44. The **WMO Integrated Processing and Prediction System (WIPPS)**, a worldwide network of operational centres operated by WMO Members and relevant operational organizations, provides defined analysis and prediction products. These products are operationally available among WMO Members and relevant operational organizations for applications related to weather, climate, water, and related environments. The WMO Regional Climate Center (RCC), hosted by the CIMH, is one of the WIPPS RCCs conducting regional climate prediction and monitoring.

45. The Infrastructure Commission recommended that WIPPS be evolved to meet user requirements, support the Early Warnings for All initiative, and follow up on the WMO Unified Data Policy. The Infrastructure Commission **agreed to increase the number of analysis and forecast products and to provide these at higher resolution**. This update includes impact-based indexes and the new set of tropical cyclone variables that will be beneficial for CMO Members to provide better quality forecasts and warnings.

WMO Research Board

Machine Learning and Artificial Intelligence in Weather Prediction

46. Council will recall that the Coordinating Director serves as the WMO RA IV Focal Point for Research and Earth-system Modeling and RA IV Representative to the WMO Research Board. In that capacity, she organized a first of its kind webinar in RA IV on [Machine Learning \(ML\)/Artificial Intelligence \(AI\) in Weather Prediction](#), with the aim to:

1. Discuss how ML/AI works in relation to weather/climate prediction.
2. Identify the prospects of ML/AI in predicting weather and climate events
3. Examine the best use of Artificial Intelligence Weather Prediction (AIWP) versus other numerical prediction methods.
4. Identify the challenges faced in applying AIWP in regions with limited data availability.

<p>Dr. Arlene Laing WMO RA IV Focal Point on Research and Earth System Modeling (FP-RM)</p> <p>PR of the British Caribbean Territories with WMO and Coordinating Director Caribbean Meteorological Organization (www.cmo.org.tt)</p>	
<p>Dr. Veronique Bouchet Chair of the WMO Research Board Task Team on AI</p> <p>DG - Canadian Centre for Meteorological and Environmental Prediction (CCMEP), ECC</p>	
<p>Dr. Paul Roebber Distinguished Prof. University of Wisconsin - Milwaukee</p> <p>Program Director, Bachelor of Science in Data Analytics and Master of Science in Data Science Director and Founder, Innovative Weather CIRA Senior Research Associate</p>	
<p>Dr. Mark DeMaria CIRA/CSU Senior Research Scientist, Colorado State University American Meteorological Society (AMS) Fellow</p>	
<p>Dr. Fernando Pech Researcher and professor from Superior Technological Institute of Los Rios, Tabasco, Mexico</p> <p>Member of the Topic Group AI for Flood Monitoring and Detection at the International Telecommunication Union (ITU).</p>	

47. In order to guide Members in AI /ML matters for weather prediction in 2024, the WMO Research Board established an *Artificial Intelligence for Weather Task Team (AI4Wx TT)*, chaired by Dr Veronique Bouchet, Canada, and Dr Catherine de Burgh-Day, Australia. This new task team is continuing the work of the *RB Task Team on Exascale Computing, Data Handling and Artificial Intelligence*, which produced two Concept Notes:

- [WMO Concept Note on Data Handling and the Application of Artificial Intelligence in Environmental Modelling](#) (Hines et al., 2023):
- [WMO Concept Note on Exascale Computing and Data](#) (Govett et al., 2023)

Research Board Task Team on Early Warnings for All

48. Council is asked to note that the RB Task Team on Early Warnings for All was established by the Research Board in February 2024 and is co-chaired by the Coordinating Director, **Dr Arlene Laing**, in her role as RA IV Focal Point for Research and Modeling, and **Prof. Jim Hurrell** of Colorado State University. The task team is planning a series of workshops in each Regional Association to harvest seeds of innovations to support early warnings for all. An in-depth, in-person decision workshop is being planned for 2025 as a collaboration of WMO RA IV and the WMO Research Board.

49. In response to [Resolution 35 \(Cg-19\)](#) – *Scientific Advisory Panel Recommendations with Research Board Appraisal*, the Chair of the Research Board is proposing to establish a new **Task Team on Social Science and Geophysical Science Integration** (TT-SSGSI). TT-SSGSI will focus on the integration of social science and geophysical sciences in the context of research to operations.

C. UN Early Warnings for All

50. The WMO Congress [Resolution 4 \(Cg-19\)](#), references the UN global initiative, led by the WMO and UN Disaster Risk Reduction (UNDRR), to protect all persons from hazardous weather, water, or climate through early warning systems by 2027. **Early Warnings for All** is the **highest priority** of the 19th World Meteorological Congress. The WMO *Early Warnings for All: Executive Action Plan 2023–2027* was launched by the UN Secretary-General, **António Guterres**, at the 27th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC/COP 27) in November 2022 and approved by the Parties.

51. The Council is reminded of the four pillars of a multi-hazard early warning system (MHEWS), centred on people and having appropriate governance, institutional arrangements, multi-sector partnerships, and cultural context, are:

- Pillar 1 – Disaster risk knowledge and management (led by UNDRR)
- Pillar 2 – Detection, observation, monitoring, analysis, and forecasting (led by WMO)
- Pillar 3 – Warning dissemination and communication (led by ITU)
- Pillar 4 – Preparedness and response capabilities (led by IFRC)

52. WMO leads the implementation of Pillar 2, and supports Pillars 1, 3 and 4. Similar contributions are being made by the National Meteorological and Hydrometeorological Services at the national and regional levels with the support of the Organs of the CMO and other partners. An [Early Warnings for All Dashboard](#), where data for the four Pillars, as well as those for disaster risk reduction (DRR) strategies and cross-cutting enablers can be monitored and visualized, has been established to track the progress of global indicators, implementation indicators, and MHEWS country capacity.

53. Council is asked to note the CMO Headquarters has been actively contributing to the national consultations for Antigua and Barbuda and Barbados, two of the priority countries for EW4All. The Council is asked to further note other **selected** CMO Headquarters activities since CMC65, in support of *Early Warnings for all* including:

- Member, WMO RA IV Hurricane Committee; contributor to the Operational Plan
- Co-chairing the Severe Weather Forecasting Programme Eastern Caribbean Management Team, for high-impact severe weather that occur any time of year, including drafting a Severe Weather Operational Plan and supporting the development of a new severe weather case catalogue and database in the Caribbean.
- Contributing to the Regional Early Warning System Consortium that is led by CDEMA
- Co-organized webinars on the *Common Alerting Protocol* (CAP), May 2024

D. WMO Integrated Global Observing System (WIGOS)

Implementation of Global Basic Observation Network (GBON)

54. Council recognizes that high quality and timely observations are fundamental to the accuracy of weather forecasting. As such, the CMO Headquarters helps Member States to become compliant with WIGOS and GBON requirements, thereby supporting real-time sharing and integrating of data, conducive to rapidly-evolving hazards, and in archives, for climate analysis, research, and risk knowledge.

55. Council is asked to note that the WMO *Global Basic Observing Network* (GBON) is intended to ensure availability and international exchange of basic surface observation data, which underpin all weather, climate and water services and products for the public good of all nations. The GBON is designed, defined and monitored at the global level, with its implementation having **direct positive effect on the quality of weather forecasts, thus helping improve the safety and well-being of people around the world.**

56. Council will recall that GBON implementation started on 1 January 2023. To support that process, the WMO *Infrastructure Commission* (INFCOM) developed a GBON Implementation Operating Plan, provided guidance materials for the initial composition of GBON, Members' GBON compliance and GBON global gap analysis (guidelines in [References to GBON material](#)).

Systematic Observations Financing Facility (SOFF): Supporting implementation of GBON

57. The *Systematic Observations Financing Facility* (SOFF) is a financing and technical mechanism to support the *Global Basic Observing Network* (GBON). The SOFF, which was formally launched at UNFCCC COP26, will allow developing countries to deliver their contribution to GBON. SOFF investment focuses on long-term observational data exchange as a measure of success.

58. The intent is to support operating and maintenance costs of a country's basic observation infrastructure through results-based finance. It will produce local benefits while delivering on a global public good – that of better global weather forecasts and climate information for all nations. SOFF is a UN fund, co-created by WMO, UNDP and UNEP to close the most severe gaps, with priority given to Least Developed Countries and Small Island Developing States (SIDS).

59. More than 65 partner institutions are to provide systematic, standardized, and coordinated support to beneficiary countries to achieve compliance with the GBON. Belize, Grenada, and Guyana are the CMO Members in the first batch of beneficiaries of the SOFF. Barbados, Dominica, Jamaica, Saint Lucia, St Kitts and Nevis, St Vincent and the Grenadines, and Trinidad and Tobago are in the third batch.

60. Council is reminded that during its initial 3-year implementation period, SOFF has been prioritizing support to 55 SIDS and LDCs, including the CMO Member States listed above. SOFF support is being provided in three phases. In the Readiness phase, the country's hydrometeorological status are assessed, the GBON gap defined and a plan developed to close the gap. The Investment phase enables countries to close the GBON investment and capacity gap. The Compliance phase supports sustained GBON compliance and enables access to improved weather forecasts and climate analysis products.

61. CMO Headquarters has been supporting the implementation of SOFF in the CMO Member States through coordinating with the peer advisor institutions and advising Members during the SOFF Readiness phase, and sharing guidance and regional expertise to SOFF implementing partners such as the World Food Programme in the Caribbean and the Inter-American Development Bank (IDB). The CD had travelled to Grenada in August 2023 for the launch of its Readiness Phase and the STO travelled to Barbados for regional consultation on SOFF in February 2024, with beneficiaries and implementation partners, and supported its Readiness Phase.

62. Council is asked to note that CMO Headquarters has been advocating for a Regional Approach to SOFF implementation for greater efficiency and leveraging of existing infrastructure and regional arrangements. Recognizing that the Caribbean has an established upper air network that provides coverage for multiple countries, which precludes the requirement for an upper air station per country, the CMO Headquarters has been seeking an optimal strategy in collaboration with WMO, NOAA, and SOFF Beneficiary States. A regional SOFF workshop is being planned for RA IV in the first quarter of 2025.

63. Council is reminded of the actions required of CMO Member States, per Resolution 2 of the WMO Extra-ordinary Congress (2021) for GBON:

- **Urges** Members to immediately commence their implementation of this network, including the necessary preparations for GBON station designation and GBON data exchange, if needed in a phased approach, as allowed by their individual capacities, where applicable, in combination with support of multilateral and bilateral development partners, and financial mechanisms such as the *Systematic Observations Financing Facility* (SOFF);
- **Urges further** Members to support the implementation of GBON, including by supporting the development and establishment of SOFF and to consider contributing resources – financial, technical or in-kind – to its development and operation.

64. With the support of the CMO Headquarters Science and Technology Officer (STO), CMO Members have been making progress towards reaching compliance with GBON. As of November 2024, five CMO Members (Antigua and Barbuda, Barbados, Grenada, Guyana, and Trinidad and Tobago) were exchanging observations hourly for the full 24 hours. Other Members were exchanging data at 3-hourly and 6-hourly intervals or exchanging hourly for less than a 24-hour period. Council is referred to the report of the Annual Meeting of the Directors of Meteorological Service (Item 9) for further details.

WMO Information System (WIS) and WIGOS

65. Council will recall that the *WMO Integrated Global Observing System* (WIGOS) is an all-encompassing approach to the improvement of WMO's global observing systems, needed in all countries. WIGOS, together with *WMO Information System* (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.

66. The Council will recall that WIGOS became operational in 2020 and that, as with all Member States of WMO, CMO Member States should be implementing WIGOS. The goal is for all Member States and their partners to benefit from a fully operational system. EC-78 has adopted all amendments to the [Manual on WMO Integrated Global Observing System](#).

67. National Meteorological and Hydrological Services have been stewards of the long-term observations that underpin climate knowledge, which in turn informs climate action. WMO Congress requested Members to implement **WIGOS, WIS, and the WMO Unified Data Policy, which ensures that core earth system data needed for prediction and analysis for the public good of all nations is of the highest quality**

Council will recall that in June 2023, CMO Headquarters hosted the WMO WIS2.0 in a Box Workshop for 19 participants from 15 countries, where participants learnt how to install and configure the software to enable ease of local and international data exchange. Due to the support of a core group of participants, CMO and WMO, by October 2023, CMO States were exchanging data nationally and internationally, and were among the first to pilot this new technology.

68. The Council is requested **to formally recognize the contributions of Ms Kimberly Seaton and Mr Dwayne Scott for their dedicated service** to the operation of the Caribbean node of the WMO Information Systems. Their contributions have enabled the Caribbean to be on the leading edge of this new method of international data exchange that is facilitating data assimilation and improvements in the global numerical weather prediction models, which is for the public good of all nations.

69. Council will recall that CMO and WMO signed a Letter of Agreement whereby WMO provides cloud services to support a CMO Node of WIS for four years. WMO has recommended affordable options for CMO Headquarters to maintain the WIS2.0 node after the period of the agreement.

Regional WIGOS Centre

70. Council is reminded that CMO Headquarters is ensuring the availability, accuracy, and timeliness of weather, climate, and water observations and related data and information from National Meteorological and Hydrometeorological Services

71. **In December 2023 the United States, Canada, CMO Headquarters, Trinidad and Tobago and Costa Rica began piloting a *Regional WIGOS Centre for WMO RA IV*** (North America, Central America, and the Caribbean) - to ensure the quality, accuracy, and timeliness of observations. **CMO Headquarters and Trinidad and Tobago Meteorological Service are responsible for the data quality and metadata management for the English-speaking Caribbean, respectively.** This effort has improved the availability and quality of observational data of CMO Members.

E. The Global Framework for Climate Services (GFCS)

72. The Council will recall that the ***Global Framework for Climate Services*** (GFCS), a United Nation (UN)-led initiative which started in 2012, spearheaded by WMO, is being implemented throughout the world to guide the development and application of science-based climate information and services in support of decision-making.

73. As a framework with broad global participation and reach, GFCS enables the development and application of climate services to assist decision-making at all levels in support of addressing climate-related risks and outcomes at national, regional and global levels. The priority areas for the GFCS are (i) Agriculture and food security (ii) Disaster risk reduction, (iii) Energy (iv) Health and (v) Water. The GFCS is currently being implemented through eight global projects, many with an emphasis on developing countries and Small Island Developing States.

74. Through the CREWS Initiative, CMO Headquarters has been supporting the development of governance frameworks, legislation, and other mechanisms to support Members in developing Climate Services. That includes Strategic Plans and National Frameworks for Weather, Water, and Climate Services and in support CIMH as need in their implementation of the Climate Services and Related Applications (ClimSA) project.

F. Disaster Risk Reduction and Regional Severe Weather Forecasts and Warning Systems

Tropical Cyclone Programme

75. The Caribbean Meteorological Council is aware that activities within the WMO *Tropical Cyclone Programme* (TCP) are among the most important to the Caribbean and other tropical basins. The TCP is essential to help reduce the disaster risk associated with the tropical cyclones. The most critical regional activity under the TCP is the *Hurricane Committee*, serving the *North Atlantic, East Pacific and Caribbean Basin*. The Hurricane Committee has at its core, *the US*

National Hurricane Center, which is one of WMO's primary *Regional Specialized Meteorological Centres* (RSMCs) for tropical cyclones.

76. Most Meteorological Services in CMO 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 the loss of lives. The Hurricane Committee defines and routinely updates the warning system for tropical cyclones in the North America, Central America and the Caribbean region, including the areas of responsibility of the NMHSs in each Member State in the provision of tropical cyclone forecasts and warnings. The warning system includes back-up arrangements between Meteorological Services with warning responsibilities.

77. The **46th WMO RA IV Hurricane Committee** met on 18-22 March 2024 in Panama City, Panama. The meeting report was finalized after a period of review following the meeting. In addition to the updating of the Operational Plan and report of impacts by Members, the following side events were focused on emerging and ongoing initiatives of WMO, UNDRR, UNESCO-IOCARIBE, and other partner organizations involved in observations, prediction, and research, and delivery and communication of tropical forecasts and warnings. A special session focused on tropical cyclone research, including modeling with artificial intelligence and its impact on weather prediction, which indicated skillful track forecasts but poor intensity forecasts.

78. Council is asked to note that CMO Headquarters participated in two panels at the 46th Hurricane Committee, specifically:

- **Ocean Panel:** The Panel recognized the critical need to consolidate a marine and ocean in situ observational network to support the forecasting process and services themselves. Dr Mike Brennan, Chair of the Committee, made a keynote presentation on tropical cyclone rapid intensification, Mr John Parker, Prof Scott Glenn and **Mr Kenneth Kerr** presented on "Consolidating the value chain: From ocean observations to coastal inundation forecasting". The panel provided several recommendations for enhancing ocean observations to ensure a safe and well-predicted ocean.
- **"Hurricane Early Warnings For All" Panel:** The panel focused on ways in which the RA IV Hurricane Committee can support the implementation of EW4All by fostering cooperation and sharing good practices among regional stakeholders. **Dr. Arlene Laing** presented on the Role of the CMO in supporting early warnings for all, providing insights into the ongoing collaboration among insights into ongoing collaboration efforts among regional organizations and UN agencies regarding EW4All.

WMO Severe Weather Forecasting Programme (SWFP) Eastern Caribbean

79. Council will recall endorsing a proposal by CMO and partners in 2015 to implement a WMO *Severe Weather Forecast Demonstration Project* (SWFDP) Eastern Caribbean, which was established in 2016. In June 2019, the 18th WMO Congress designated the transition of the SWFDP to be designated as the **Severe Weather Forecasting Programme (SWFP) Eastern Caribbean (EC)**. Council is reminded that in 2021, it was agreed that products on the SWFP Extranet could be made available to NMHSs in Caribbean states outside of the formal EC domain. Météo-France Martinique hosts the **Regional Forecast Support Facility** (RFSF) of the SWFP EC, including the Extranet that serves NWP products and observations to support severe weather forecasts.

80. The SWFP Regional Subprogramme Management Team (RSMT) is co-chaired by **Mr Emmanuel Cloppet**, Météo-France Antilles et Guyane, and **Dr. Arlene Laing**, CMO Headquarters. Other CMO representatives on the RSMT include **Ms Kathy-Ann Caesar** of the CIMH, as the training lead, and **Mr Dale Destin**, Director of Antigua and Barbuda Meteorological Service, representing CMO National Meteorological Services. Since CMC65 (November 2023, Port of Spain), the RSMT met on 14 December 2023 (virtually) and on 19 March 2024 on the side of the 46th Hurricane Committee in Panama City, Panama in hybrid mode.

81. The RSMT in December 2024 agreed to the **addition of Guyana to the SWFP Eastern Caribbean** at the request of the *Standing Committee on DRR and Early Warning Services*, noted that Guyana is a priority country for the UN Early Warnings for All but there was no Severe Weather Forecasting Programme in RA III to support Guyana. It was also noted that through the CMO, Guyana has been receiving training on severe weather forecasting through training workshops in the Caribbean. Subsequently, the PR of Guyana submitted a formal request to the President of RA IV to be added to the SWFP Eastern Caribbean and the change in the programme was reported to the RA IV Management Group at its meeting in January 2024. Guidance on excessive heat was also requested from the SWFP in 2023.

82. Presentations were made by the WMO *Standing Committee on Disaster Risk Reduction and Early Warning Services* on the UN **Early Warnings for All**. RFSF Martinique reported on the initial performance of the new AROME model, the first operational high-resolution ensemble model for explicit convection prediction in the region. The model has a 1.3km grid for deterministic model and a 2.5km grid for the ensemble, able to resolving small island circulations. The RSFP continues provision of automatic products, including new excessive heat products.

83. Co-Chair, Dr Laing, reported to the 46th Hurricane Committee and the RSMT meeting on the activities of the SWFP, achieved through direct support to the SWFP and leveraging related workshops. The Dominican Republic nominated *Mr Wagner Rivera* to join the RSMT, following a previous decision to invite Dominican Republic to join the RSMT because of its role as a regional leader for Flash Flood Guidance System and the Coastal Inundation Forecasting Initiative.

84. Council is asked to **urge Members to nominate a Severe Weather Forecasting Programme focal point**. Forecasters trained under the SWFP are encouraged to train fellow forecasters on the competencies learnt and to use the SWFP-EC Extranet products.

85. CMO Headquarters helped to organize and presented to a well-received NOAA WMO RA IV Workshop on an Interactive Analysis of Tropical Storm Philippe (2023), that was held on 4-7 June 2024, as a virtual workshop hosted by CIMH. That storm affected all of the Eastern Caribbean but was a very challenging storm to forecast as its track was affected by interaction with another tropical cyclone, Rina, resulting in a stalled system and interactions among different convection clusters mainly to the south of the centre of the storm.

86. The Coordinating Director met with *Ms Virginie Schwarz*, Executive Director of Météo-France, on the side of the 78th WMO Executive Council, 10-14 June 2024, to review the SWFP EC and other collaborative activities, per the formal *Working Arrangements* between CMO and Météo-France.

87. Plans for the Severe Weather Forecasting Programme Eastern Caribbean for 2024 to 2025, include:

- Forecaster exchange and attachments for familiarization with forecast areas of responsibility
- Technical Workshop on the use of the SWFP-EC Extranet, Communication, and Public Weather Service
- Enhancement of the severe weather case study catalogue including translation to other languages

88. CMO Headquarters hosted two interns sponsored by the CCRIF-SPC during September to November 2024, to support the activities of the SWFP, specifically:

- Enhancement of the severe weather case catalogue for the Caribbean, with the addition of the geographic aspects. to enhance severe weather forecasting skill and contribute to monitoring of losses and damages. The Severe Weather Database is hosted by CIMH at <https://cswd.cimh.edu.bb/> and mirrored on a server at CMO Headquarters

- Updating of the first draft Severe Weather Operational Plan, which was developed in 2021. The project focused on the transition of the SWFP to operational phase at the regional and national level. Members were surveyed on their severe weather forecast plans and procedures, severe weather priority hazards, use of NWP, including ensemble products, forecast products used, primary observations, and methods of accessing the data used.

89. The WMO requested CMO Headquarters to join meetings of RA IV in June and October 2024 to support the establishment of a Severe Weather Forecasting Programme (SWFP) Central America, to share lessons learnt from the implementation of the SWFP in the Caribbean.

ACTIONS PROPOSED TO COUNCIL

Council is asked to:

- (i) **Note** the decisions of the 78th session of the Executive Council (EC) and the Technical Commissions
- (ii) **Encourage** Member States to nominate national focal points for radio frequency coordination, to support protection of spectrum bands vital for earth observations and meteorological applications, as requested by WMO Infrastructure Commission
- (iii) **Encourage** Member States to leverage resources through the funding mechanisms available to support *Early Warnings for All*
- (iv) **Note** the activities of the Research Board, including the Task Team on Early Warnings for All and Task Team on Artificial Intelligence for Weather Prediction.
- (v) **Urge** CMO Member States to ensure that their NMHSs complete activities for the Operational Phase of WIGOS
- (vi) **Urge** CMO Member States to become compliant with GBON, which became operational at the start of 2023, following the guidelines from WMO
- (vii) **Commit** Members' NMHSs to maintaining their support and participation in the CMO WIS2.0 Node
- (viii) **Formally commend** the work of **Mr Dwayne Scott**, National Meteorological Service of Belize, and **Ms Kimberly Seaton**, Trinidad and Tobago Meteorological Service (TTMS) for their dedicated service to the development and ongoing operation of the Caribbean WIS 2.0 node, for real-time national and international data exchange
- (ix) **Note** the activities on the *Virtual Regional WIGOS Centre (RWC)* as a collaboration among the US, Canada, CMO Headquarters and the Trinidad and Tobago Meteorological Service
- (x) **Continue** its strong support for the *Global Framework for Climate Services* and to **urge** Member States to actively participate in GFCS projects and activities
- (xi) **Note** and **support** the important work of the regional Hurricane Committee
- (xii) **Note** and **support** the important work of the Severe Weather Forecasting Programme in the Caribbean

- (xiii) **Urge** Members to nominate National Focal Points for the Severe Weather Forecasting Programme, to help advance to the operational phase of the programme

CMO Headquarters
November 2024
