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ANNUAL MEETING OF DIRECTORS OF METEOROLOGICAL SERVICES **Doc. 5**
RODNEY BAY, SAINT LUCIA, 19 NOVEMBER 2025

OUTCOME/HIGHLIGHTS FROM WMO TECHNICAL COMMISSIONS & THE 79TH SESSION OF THE EXECUTIVE COUNCIL AND WMO EXTRAORDINARY CONGRESS 2025 AND RELATED MEETINGS
(Submitted by the Coordinating Director)

SUMMARY

The World Meteorological Organization (WMO) Extraordinary Congress 2025 (Cg-Ext 2025) was held in a hybrid format from 20-23 October 2025 in Geneva, Switzerland, followed by the Extraordinary Session of the Executive Council (EC-Ext2025) on 24 October 2025 while the Extraordinary session of the Commission for Weather, Climate, Hydrological, Marine and Related Environmental Services and Applications (SERCOM-Ext 2025) was virtually from 18 to 20 March 2025**.**

Outcomes and highlights relevant to National Meteorological and Hydrological Services include: *The Regional Basic Observation Network implementation, WMO Integrated Processing and Prediction System (WIPPS) and Artificial Intelligence integration, Climate Monitoring and the State of the Climate Reporting, Global Greenhouse Gas Watch, WMO Statement in Weather Modification, and WMO's Position on Radio Frequency Coordination to Protect Bands Vital for Weather and Climate.*

A. REGIONAL BASIC OBSERVATION NETWORK (RBON) DESIGN AND IMPLEMENTATION

1. The WMO Regional Basic Observation Network (RBON) is intended to be an observation network designed by the Regional Associations (RAs) to address region-specific challenges across multiple domains, including meteorology, hydrology, and oceanography. RBON will be developed using existing observing systems, with the Global Basic Observation Network (GBON) forming an integral subset of it (Figure 1).

2. A station may be designated as part of RBON if it meets one or more requirements of any WMO Application Area, provides observations for international exchange in real or near-real time, and there is a national commitment to operate the station for a minimum of four (4) years. Additionally, RBON should include a sufficient number of weather radars to enhance Global Numerical Weather Prediction (NWP) capabilities, particularly for precipitation and wind analyses. The WMO Early Warning for All In Focus : Hazard Monitoring and Forecasting emphasizes that RBON must take into account the EW4All observational user requirements and gaps, thereby helping to address the observational needs of the EW4All initiative.

3. To coordinate global progress, WMO convened an RBON Implementation Coordination Meeting on 6 June 2025, bringing together all RAs to review the status of RBON development, assess progress, and coordinate the design and rollout of RBON across all WMO Regional Associations.

4. RBON development is progressing at different levels across the RAs. RA II (Asia) and RA V (South-West Pacific) are advancing with pilot projects, while RA I (Africa) and RA VI (Europe) have drafted RBON requirements for approval in 2026. RA III (South America), RA IV (North America, Central America, and the Caribbean), and the Antarctic region remain in the earlier stages of development.

5. The WMO aims to maintain regular coordination with RA leaders to accelerate progress toward global RBON implementation by the end of 2026. In line with this target, RA IV is expected to conduct workshops in 2026 to begin designing and launching its RBON implementation. These workshops will focus on training National Focal Points, establishing regional design criteria, and defining data-exchange formats.

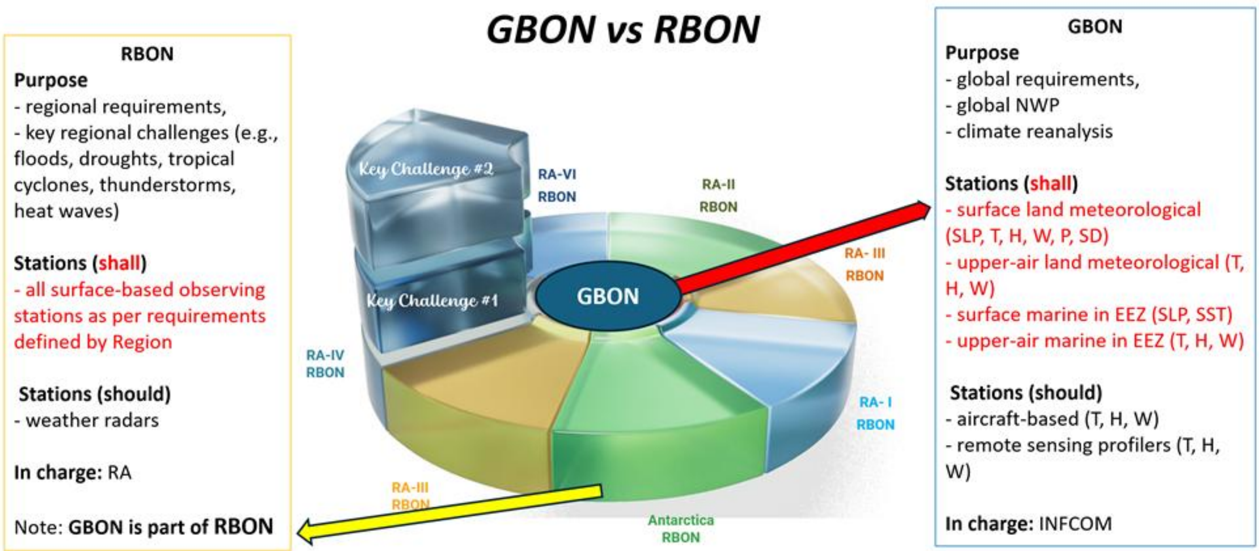

Figure 1. RBON concept and design compared with GBON

RBON Focusing on Caribbean Region-Specific Challenges

6. Region-specific challenges from an early warning perspective that RBON may seek to address include tropical cyclones, heavy rainfall, thunderstorms, riverine and flash flooding, extreme heat, high winds, lightning, drought, landslides, high Saharan dust concentrations and degraded air quality, volcanic ash, hazardous seas, and coastal flooding. An RBON designed to observe variables relevant to these region-specific challenges will likely include the variables listed in Table 1.

Table 1. Potential Variables to be addressed by RBON for Region –Specific Challenges

RBON Observed Variables to Address Region-Specific Challenges	
Network of automatic temperature monitoring stations (1-minute data)	Regional radar composite
Network of atmospheric pressure monitoring stations	Network of lightning monitoring stations
Network of automatic rain gauges providing real-time rainfall data	Network of automatic marine stations
Network of automatic tipping bucket rain gauges with rainfall at 1-minute interval	Network of automatic tidal gauges

Network of surface wind monitoring stations	Network of air quality stations
Network of upper-air wind monitoring stations	

7. A key milestone in the design of the RA IV RBON is the adoption of a new sub-regional configuration for upper-air stations and platforms in the Caribbean, approved during the WMO RA IV session to meet RBON requirements for upper-air wind observations (Figure 2).

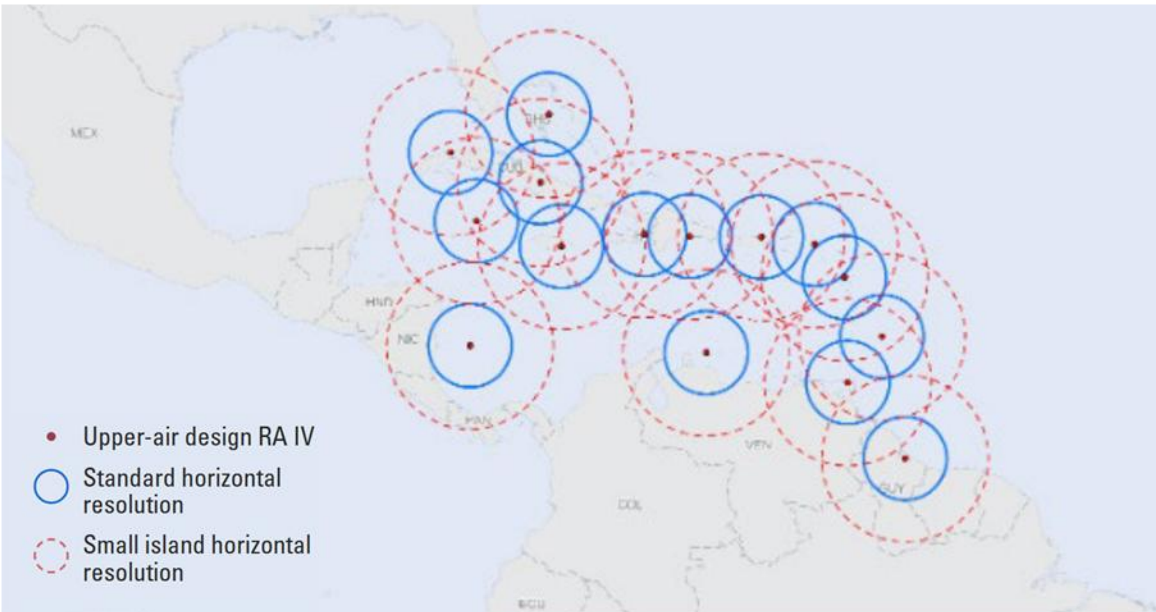

Figure 2. RA IV regional design of the upper-air GBON component with coverage of the Caribbean. The red dots indicate upper air stations, blue circles indicate the GBON standard horizontal resolution, while the red dashed circles refer to the GBON horizontal resolution for small islands.

Implications for CMO Members NMHSs

8. Strong regional coordination is essential for RBON. NMHSs must actively participate in the design and implementation of the RA RBON, attend coordination meetings and capacity-building efforts. NMHSs must also prepare to participate in the RAs survey to assess national gaps in observing capabilities relative to RBON design criteria and to develop a strategies and plans to support RA IV RBON implementation. Ongoing monitoring and continuous improvement will be required, including NMHSs providing regular performance data and participating in region-wide monitoring frameworks such as WDQMS.

B. WMO INTEGRATED PROCESSING AND PREDICTION SYSTEMS (WIPPS) AND ARTIFICIAL INTELLIGENCE

9. The WMO envisions that Artificial Intelligence (AI) will deliver faster, higher-resolution and user-tailored information across all timescales. To realize this potential, WMO has agreed on an action plan on AI as part of a package of resolutions to grasp opportunities and meet challenges in a rapidly changing world and has started the integration of AI into its global forecasting infrastructure.

10. A new Joint Advisory Group on Artificial Intelligence will guide WMO activities in relation to the development and use of AI intelligence technologies in meteorology and hydrology. Its mandate includes accelerating integration of AI into the WMO systems, with a special focus on incorporating AI

into **WMO Integrated Processing and Prediction System (WIPPS)**, the backbone of all forecasting, and research activities.

11. WMO will also collaborate with the public, private and academic sectors in applying AI and machine learning technologies to strengthen the entire weather, climate, water science to services value cycle. While recognizing AI's revolutionary potential, WMO emphasizes the need to maintain scientific and ethical standards and to uphold the role of National Meteorological and Hydrological Services as the authoritative source of public warnings.

12. The WMO Extraordinary Congress 2025, approved Resolution 2.3(1)/1 - **Development of a new WMO Integrated Processing and Prediction System (WIPPS) Strategy Incorporating Artificial Intelligence**. This resolution aims to enhance weather and climate forecasting, improve early warning systems, and bridge capacity gaps in developing countries, including Small Island Developing States. This marks a strategic shift toward leveraging AI and Machine Learning (ML) technologies alongside traditional Numerical Weather Prediction (NWP) systems.

13. The resolution establishes the foundation for AI and ML technologies to become a core component of WMO's global observation, data processing, and prediction architecture and invites Members to:

- Develop pilot projects addressing issues and challenges identified in the AI Exploration Roadmap for WIPPS;
- Organize and participate in conferences, webinars, and training activities to support the transition and share experiences;
- Contribute to the WIPPS Trust Fund to help finance global and regional AI integration initiatives; and
- Collaborate across public, private, and academic sectors to strengthen the use of AI and ML for weather, climate, and hydrological forecasting.

14. For the Caribbean Meteorological Organization (CMO) Member States, this development presents both opportunities and obligations. NMHSs will need to build technical capacity in AI/ML applications, data science, and digital infrastructure to engage effectively with WIPPS-AI initiatives. To achieve this NMHSs will need to actively participation in WMO-sponsored training, workshops, and regional AI demonstration projects.

15. The Commission for Observation, Infrastructure and Information Systems (INFCOM) also developed a plan (road map) that identified the issues and challenges for incorporating AI into WIPPS and adopted an approach to address them through WIPPS Pilot Projects.

16. Each of these pilot projects will serve as a proof of concept for broader AI integration into WIPPS and will be designed to test the scalability and effectiveness of AI solutions in operational settings. The following five WIPPS Pilot Projects are currently ongoing:

a) AI for Nowcasting Pilot Project (AINPP)
b) Data-Driven Weather Forecasting for All (Bris)
c) ECMWF/WMO AI Weather Quest
d) Multi-model Integrated Forecasting and Application (MMIFA)
e) Global Riverine Flood Prediction Pilot Study.

C. CLIMATE MONITORING AND STATE OF THE CLIMATE REPORTING

17. In line with Resolution 8 of EC 78 (Road Map for the State of the Climate at Global and Regional Scales), WMO have started updating its State of the Climate Reporting process. On 31 July 2025, WMO requested that Members nominate a national contact point for extreme event reporting, and indicated that a global summary statement will be issued in November 2025 in time for COP30,

followed by the final WMO State of the Global Climate report in March/April 2026. With Regional State of the Climate reports scheduled for release between April and June 2026.

18. To support this process, the WMO Climate Monitoring and Policy Services Division has developed a dedicated online data collection platform (Extreme Events 2025-Final Survey) for recording extreme and high-impact events. This platform serves as a single-entry point for contributions to both global and regional WMO State of the Climate reports and makes visible all contribution via an interactive map hosted by WMO.

19. Subsequent to this, WMO released its State of the Global Climate Update 2025 as of August 2025, ahead of the UN Climate Change Conference, COP30, in Belem, Brazil. The Report highlights key climate indicators and their relevance to policymaking. The report also emphasizes major social/economic disruption from extremes, and provides a snapshot of how the WMO community is supporting decision-makers with weather and climate intelligence.

20. The report underscores the central role of NMHSs in ensuring that Nationally Determined Contributions (NDCs) are science-based and actionable. It emphasizes that NMHSs have a growing role in climate services for climate action, as NDCs are increasingly recognizing the importance of climate services and early warning services. The Report calls on NMHSs to strengthen national climate-information partnerships by working closely with environment, energy and planning agencies to inform adaption strategies and NDCs.

21. Since the WMO State of the Climate report is a reference used to inform the Conference of the Parties (COP), the supreme decision-making body of the UN Framework Convention on Climate Change (UNFCCC), NMHSs would be required to increasingly play key roles in providing climate data and risk information that underpin adaptation policies.

22. NMHSs would also likely be required to contribute to national climate-negotiation readiness by providing authoritative national climate-data, trend analyses, and early-warning system status to feed into national delegations, as is already happening in Belize.

23. All Caribbean National Meteorological Service, Unit or Desk would need to ensure that they can analyze and deliver climate-trend data, early-warning information, impact-based forecasts, in formats usable by decision-makers and communities.

D. GLOBAL GREENHOUSE GAS WATCH

24. WMO's INFCOM and Research Board, in coordination with SERCOM, have been tasked with leading the Implementation Plan (IP) for the **Global Greenhouse Gas Watch (G3W).** According to the IP, the initiative is currently in its pre-operational (2024–2027) phase, with implementation focused on establishing the initial regulatory and technical framework to support full operationalization. G3W builds on existing investments and commitments by WMO Members and partner organizations that already support greenhouse gas observing networks, including ongoing investments in satellite infrastructure, data center and modelling capabilities.

25. At its Extraordinary Congress in October 2025, WMO approved a new greenhouse gas monitoring initiative **Resolution Cg-Ext (2025)-Doc (2.2): Implementation of the Global Greenhouse Gas Watch (G3W)** aimed at supporting urgent action to reduce heat-trapping gases, which are fueling temperature increases. The Resolution advances G3W objectives by integrating its key components into existing programmes, including the expanded World Weather Watch and the Global Atmosphere Watch Programmes, without adversely impacting their work plans.

26. In its initial configuration, the Global Greenhouse Gas Watch will consist of four main components:

1. A comprehensive, sustained, global observing network comprising of surface-based and satellite-based observations for CO_2, CH_4 and N_2O concentrations, total and partial column amounts, vertical profiles, fluxes and supporting meteorological, oceanic, and terrestrial variables - internationally exchanged in near real time.
2. Prior estimates of the GHG emissions derived from activity data and process-based models.
3. A set of global high-resolution Earth System models representing GHG cycles.
4. Data assimilation systems that optimally combine the observations with model calculations to generate products of higher accuracy.

27. The resulting infrastructure will produce gridded net monthly fluxes of CO_2, CH_4 and N_2O at the grid spacing of 100 km by 100 km with a minimum possible delay. Under the Resolution, WMO has urged Members to:

1. Contribute to the implementation of the G3W through provision of in-kind resources and secondment of staff.
2. Accelerate partnerships and multilateral cooperation, including the private sector, to strengthen observational networks and modelling of greenhouse gases.

28. G3W has direct implications and emerging impacts for Caribbean NMHSs. Currently, CMO Member States' NMHSs lack technical capacity, instrumentation and trained personnel to measure and analyze GHSs. Consequently, NMHSs will be expected to increasingly coordinate closely with environmental, energy and land use agencies responsible for national emissions, to obtain and share data with WMO's GHG Data Hub.

29. To enable participation, NMHSs must ensure that national GHG observations comply with WMO's Global Atmospheric Watch quality standards as data must be shared through their WIS2.0 nodes. NMHSs are encouraged to leverage WMO training and capacity-building initiatives and to develop partnerships with relevant national agencies to strengthen their technical and operational readiness for participation in the G3W framework.

E. WMO STATEMENT ON WEATHER MODIFICATION

30. At the 79th Executive Council Meeting, WMO approved Resolution 7: "WMO Statement on Weather Modification," reaffirming WMO's neutral position on weather modification. The Resolution notes that WMO neither promote nor discourages the practice of weather modification. Its annex defines weather modification as the deliberate intervention in the atmosphere to influence local weather conditions, typically through techniques like cloud seeding.

31. The Resolution clarifies WMO's official stance, emphasizing that the statement is not a policy on weather modification nor a guidance. It stresses that any weather modification activity must be grounded in sound scientific research, with clear hypotheses, rigorous evaluation and transparency. The Statement distinguishes weather modification from climate intervention and recommends that:

- Members should approach weather modification cautiously, considering the uncertainties highlighted in the WMO guidance, and ensure operational programmes are supported by credible science, evaluation frameworks, and transparency.
- Weather modification activities should adhere to high ethical and transparency standards. Members should carefully consider potential impacts and engage civil society throughout the project lifecycle.

F. RADIO FREQUENCY COORDINATION TO PROTECT FREQUENCY BANDS VITAL FOR WEATHER AND CLIMATE

32. The Radio Frequency Spectrum is now as critical as human capacity for Caribbean Early Warning Systems. The rapid expansion of commercial wireless service poses a direct threat to meteorological operations, particularly 5G/International Mobile Telecommunications (IMT), mobile satellites and earth stations in motion, unwanted emissions and interference from adjacent frequency bands, and unregulated short-range devices operating close to protected passive bands.

33. Without protection of meteorological frequency bands, national and regional forecasting, early warnings and climate monitoring capabilities are at risk, as NMHSs rely heavily on remotely-sensed observations (satellite, radar, upper air measurements). CMO Headquarters has been supporting radio frequency coordination to protect frequencies that are critical to weather forecasting and climate analysis through training and by serving on the Caribbean Spectrum Management Task Force, led by the Caribbean Telecommunications Union.

34. In May 2025, WMO issued its Preliminary Position on the World Radio Communication Conference 2027 (WRC-27) Agenda. Key WMO positions by agenda items and relevance for Caribbean NMHS are highlighted in **Annex I**.

35. NMHSs are advised to use WMO's positions to engage and work with national spectrum management and telecommunication regulators and authorities to represent meteorological spectrum interests and advocate for protection of meteorological spectrum bands in support of early warning services and systems at national levels.

CMO Headquarters
November 2025

Annex I: Key WMO Positions by Agenda Item of 2027 World Radiocommunication Conference (WRC-27)

Agenda Item	Frequency Range	WMO Position	Relevance for Caribbean NMHSs & Interest of Concern for Meteorology
1.1 & 1.3	~47–54 GHz	Allow ESIMs and FSS only if protection of earth exploration-satellite service (passive) (**EESS-passive)** ensured and protected in the adjacent frequency bands for temperature profiling is guaranteed.	Vital frequencies used for atmospheric temperature profiling. Ensures accuracy of **upper-air and surface temperature data** used by global NWP models affecting tropical forecasting. Any interference even from adjacent bands can compromise accuracy.
1.4	~17 GHz	Protect **active satellite radars** (SAR) used for ocean and rainfall monitoring. Not opposed to new allocations to the FSS (space-to-Earth) and broadcasting-satellite service (BSS) (space-to-Earth) provided that the EESS (active) in the adjacent frequency band 17.2-17.3 GHz is protected	Provide reliable, high-resolution Earth observation data in all weather conditions and at all times (day or night). Important for **hurricane tracking**, **flood mapping**, and **marine forecasting**.
1.7	4.4–8.4 GHz, 14.8–15.35 GHz	Strongly **oppose 5G/IMT expansion** into 7–8 GHz and 8 GHz ranges. Used for passive sensing of Sea Surface Temperature (SST). Specific frequencies within this range (around 6.9-7.3 GHz) are used for passive microwave sensing of natural radiation from Earth, which is the only source of SST data in persistently cloudy or stormy areas.	These frequencies are vital for EESS passive remote sensing applications, specifically the measurement of SSTs that are critical for hurricane forecasting including rapid intensification. SST is a crucial input for numerical weather prediction models and for tracking the development of severe weather events like hurricanes.
1.8	231–700 GHz	**Opposes any new allocations to the radiolocation service in the frequency band 250-252 GHz where footnote RR No 5.340 applies.** Allow new radiolocation uses only if passive sensing (EESS) is protected.	Designated for EESS passive measurements and must remain emission-free to avoid harmful interference. Prevents loss of **climate and atmospheric composition monitoring** capability.
1.11–1.14	1.4–2.2 GHz	Protect satellite **telemetry, tracking & control (TT&C)** and **radiosonde data**. Not oppose to consideration of new MSS allocations provided there is no negative impact on EESS/SOS operations; no adjacent band negative impact; no impact on the operation of EESS/MetSat systems in the adjacent frequency band.	Ensures continuity of **radiosonde launches**, and satellite command links for regional weather satellites. Vital for weather forecasting, climate monitoring and early warning systems which susceptible to interference from new mass-market radio communication services like MSS.
1.17	27 MHz–614 MHz	Support **formal protection for space weather sensors**.	Essential for obtaining the accurate and continuous data needed to issue early warnings and protect life, property, and critical infrastructure. Important for monitoring geomagnetic storms that can affect aviation, energy, and communications in the Caribbean.

1.18	86–209 GHz	Strengthen protection of passive sensors from active services.	Safeguards **climate monitoring** via high-frequency sensors (e.g., ozone, water vapor).
1.19	4.2–4.4 GHz and 8.4–8.5 GHz	Support **new protected bands for SST (sea surface temperature)**.	Vital for **hurricane prediction, coral bleaching forecasts**, and **marine heatwave prediction**.