SIDS Internet Governance Forum, 31 July-1 August 2026

"From Climate Frontlines to Cyber Frontiers"

Caribbean Multi-hazard Environment and Role of National Meteorological and Hydrometeorological Services

Arlene Laing
Coordinating Director

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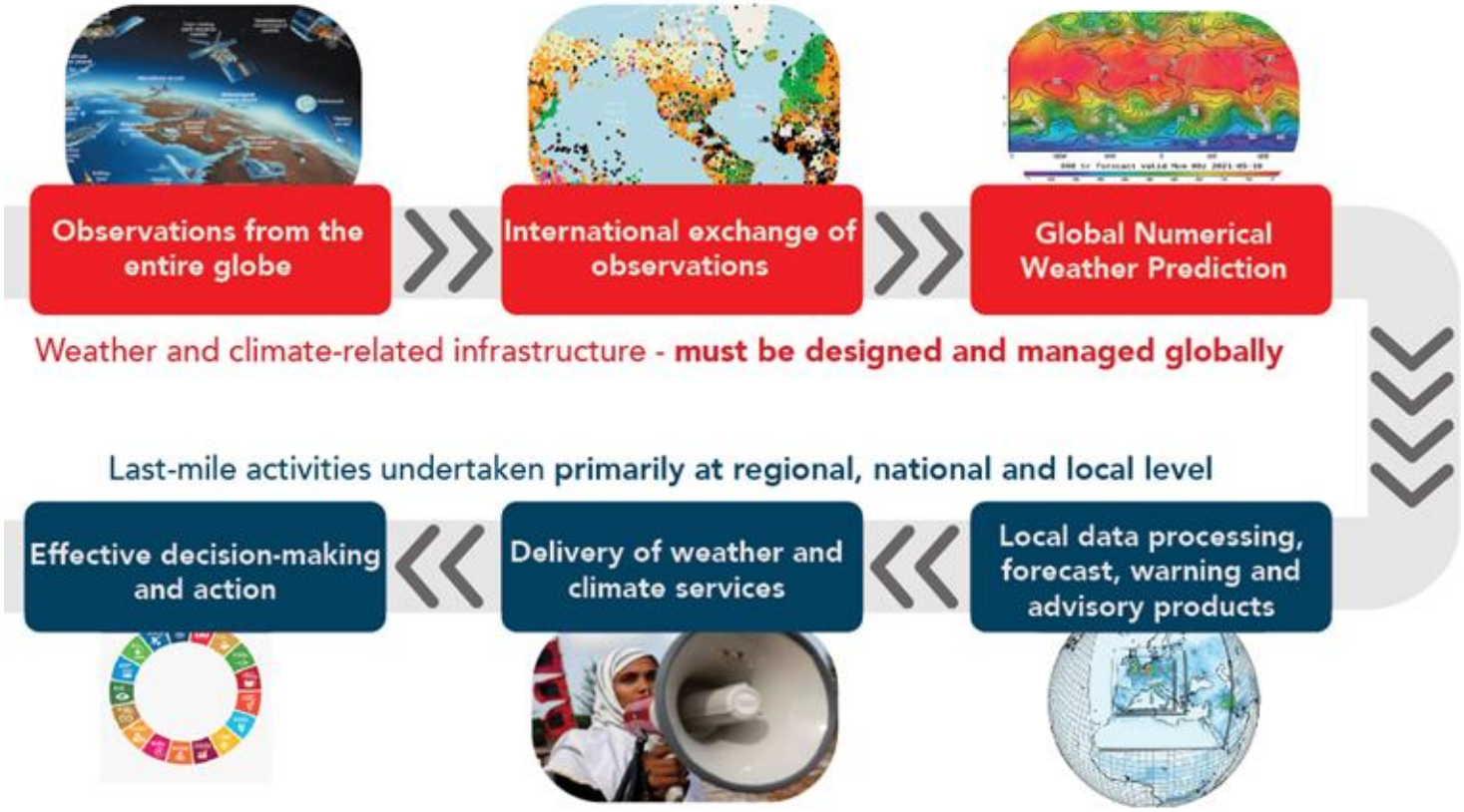
CARIBBEAN METEOROLOGICAL ORGANIZATION

BCMS – CMO

CARICOM

Caribbean Meteorological Organization Members

Meteorological Services – Global Interdependence



WMO Unified Data Policy – free sharing of core and recommended data (mainly in *real-time*)

Sharing data & scientific knowledge

- **Protects lives,**
- **Safeguards property &**
- ***Supports sustainable economic development***

1941 UK Air Ministry Met. Service

1951 **British Caribbean Met. Service**

1953 **British Caribbean Territories** joins ***WMO***

1958 West Indies Met. Service ***WIMS***

WI Federation

1962 Caribbean Met. Council ***CMC***

1963 Caribbean Met. Service ***CMS***

HQ in T&T

establishes

UNDP/WMO Support

1967 Caribbean Met. Institute ***CMI***

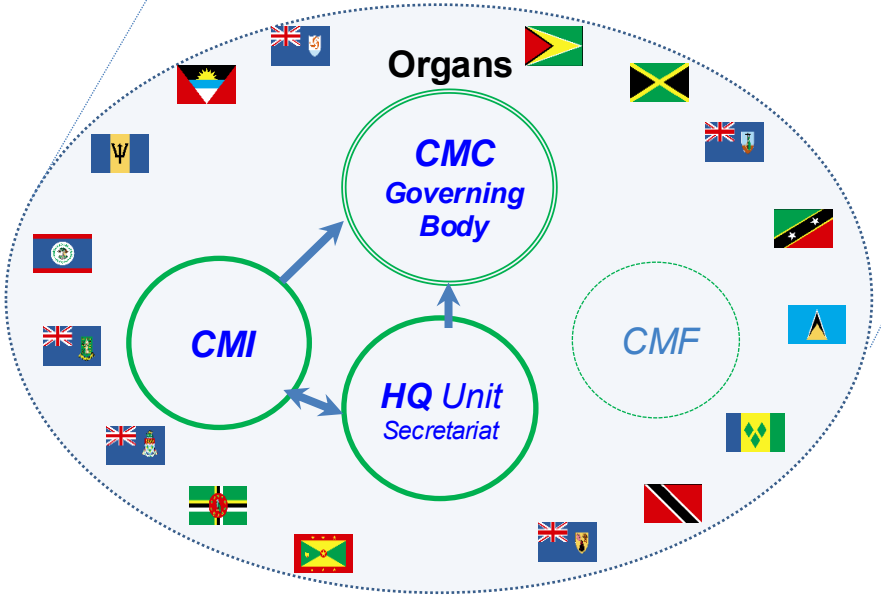
1972

Commonwealth Caribbean *Heads of Government* decide to form **CMO**, HQ in T&T

Aug 1973

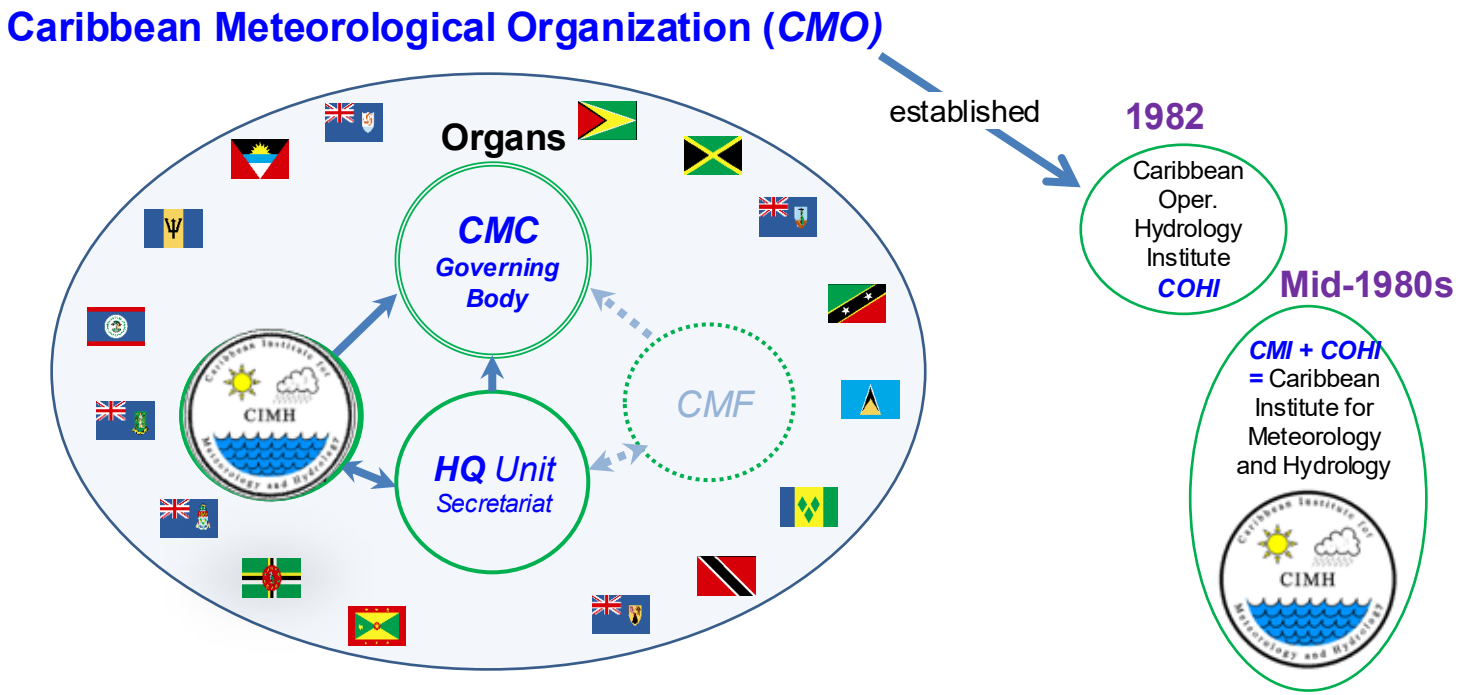
CARICOM
CARIBBEAN COMMUNITY

Oct 1973
Caribbean Meteorological Organization (*CMO*)



CMO established as Specialized Institution with founding mission: *"the promotion and coordination of regional activities in the field of Meteorology and allied sciences."*

CMO – Evolving, 1982 to 1999



Increasing need for actionable weather, climate, water, and related environmental information:
communicating disaster risk, water, recreation, climate variability/change, agriculture, health, air quality, marine, energy, ...

Caribbean Operational Hydro-Meteorology

- Began with focus on security (Aviation - War effort, 1940s)
- Expanding demands
  - climate, communicating disaster risk, water, air quality, marine, health, energy, ….
- National Meteorological and Hydrometeorological Services (NMHS) supported by or in partnership with
  - CMO Headquarters Unit and CIMH – Organs of the CMO
  - WMO and ICAO
  - Météo-France
  - Other Regional Institutions: Caribbean Disaster and Emergency Management Agency (CDEMA), The University of the West Indies (UWI), Caribbean Community Climate Change Centre (CCCCC), Caribbean Telecommunications Union (CTU)
  - Other Partners

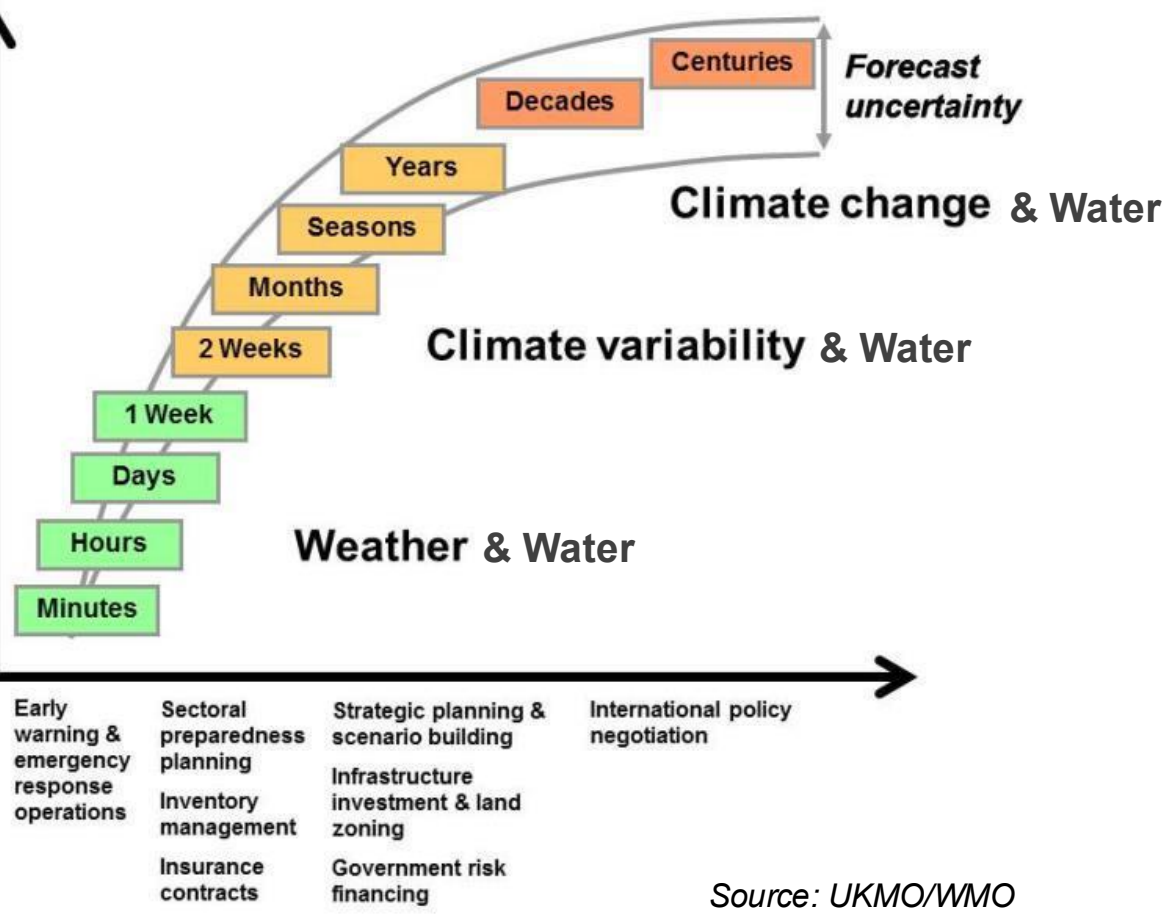
Weather, Water, Climate Prediction in the Caribbean

UWI CSGM/ CCCCC

CIMH/ CariCOF

NMHS

***(CMO HQ** coordinates agreements, supports international compliance, data exchange, data quality, develops projects, …)*



Source: UKMO/WMO

Key Function: Meteorological Services for Aviation

- **Why this matters in the Caribbean?** Airports and aviation are the primary means of rapid access, making the continuity of air navigation services especially important.

  No International Air Navigation without weather information

- **Why This Matters for Multi-Hazard Early Warning Systems**

  Four pillars of a Multi-Hazard Early Warning System:

  1. Risk knowledge
  2. Monitoring and forecasting
  3. Warning dissemination
  4. Preparedness and response

- Failure has **cascading impacts** on:
  - Safety, Emergency Response, Medical Evacuations, Humanitarian Assistance, Disaster Relief Operations, National Resilience

Air Navigation Services Intersect with All Four

MHEWS Component	Air Navigation Connection
Risk knowledge	Airport flood maps, runway wind limits, volcanic ash risk, cyclone exposure
Detection, Monitoring & Forecasting	Aviation forecasts, METAR, TAF, SIGMET, tropical cyclone advisories
Warning Dissemination & Communication	Airport operations centers, Air Traffic Control, airlines receive warnings
Preparedness & Response Capability	Supports evacuations, relief flights, medical flights, post-disaster recovery

Interdependency During a Hurricane

Consider a Category 4 hurricane approaching a Caribbean island

NMHS provides:
- Tropical cyclone warnings
- Impact-based warnings
- CAP alerts
- TAFs
- METARs
- SIGMETs
- Wind and rainfall forecasts

Air Navigation Service Provider uses this information to:
- Plan airspace restrictions
- Coordinate flight diversions
- Protect communications and surveillance equipment
- Implement contingency procedures
- Coordinate with airlines and airport operators

Airport Operator uses it to:
- Suspend operations when required
- Secure aircraft and ground equipment
- Protect navigation aids and facilities
- Activate emergency operations
- Plan post-event reopening

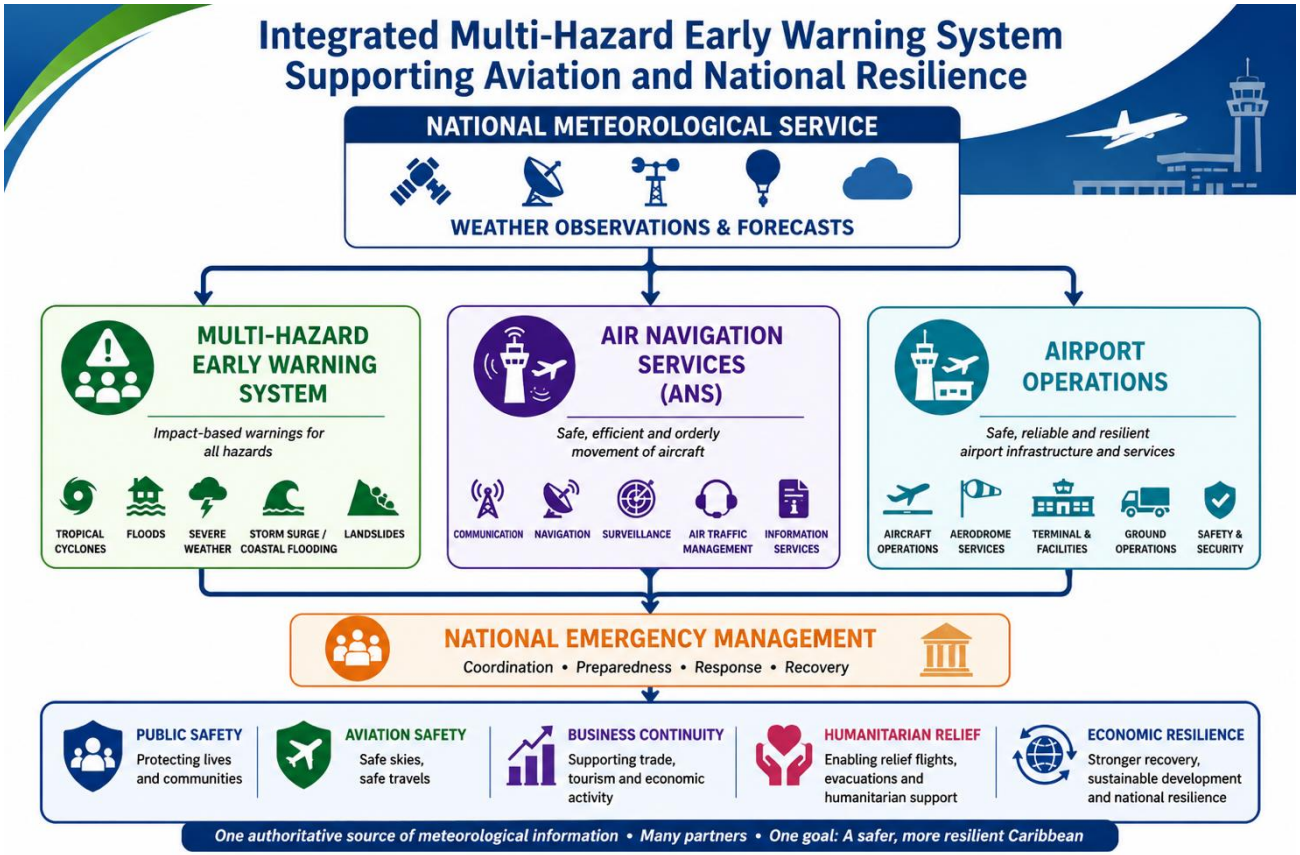
Hurricane Contingency Planning

- Hurricane contingency plan defines how agencies prepare for, respond to, and recover from a hurricane

NMHS involved:

- **Before the Event-** Enhanced monitoring, Forecast briefings, Coordination with disaster agencies, Issuing watches and warnings
- **During the Event**: Continuous forecasting, Impact updates, CAP alerts, Aviation advisories, Coordination with emergency operations centers
- **After the Event:** Damage assessments, Weather support for recovery operations, Verification and lessons learned

Multi-Hazard Early Warning Systems Supporting Hurricane Contingency Planning for Air Navigation



Business Continuity Management for NMHSs

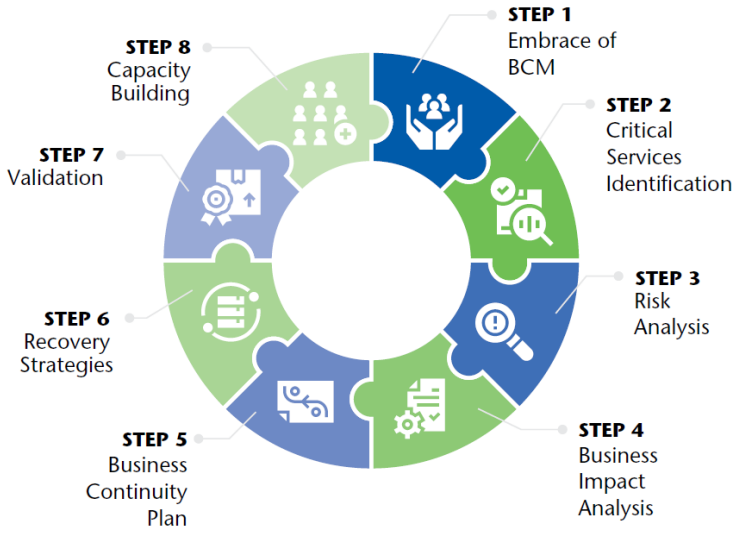
- An unprecedented surge in the need of a guidance for Members on how to maintain their operation and maintenance of systems overwhelmed during the **COVID-19 pandemic** and further highlighted during the eruption of **the Hunga Tonga-Hunga Ha'apai volcano**.
- **Examples of previous disruptions to NMHS operations**

- Cyber attack
- Power shortage
- Natural hazards
- Budget cut

Business Continuity Management

BCM is a structured, proactive system that enables an NMHS to:

- Continue delivering essential services during and after a disruption
- Protect life-saving functions such as warnings, aviation services, and data provision
- Prioritize recovery actions using documented plans and trained staff
- Strengthen resilience through regular testing and continuous improvement



A functioning BCM ensures you to **"continue to serve"** even under severe stress.

Understanding the Operational Environment

Effective BCM begins with understanding:

- **Current services & operations** (aviation, warnings, hydrological products, climate services)
- **Organizational structure & staffing**
- **Existing backup or workaround procedures**
- **Critical dependencies** (IT systems, telecommunications, power, facilities)
- **Legal/regulatory requirements**
- **Previous disruptions & lessons learned**

This forms the foundation of **Business Impact Analysis** and **BCM Policy.**

Climate Knowledge linked to Cyber Resilience

- **In the Caribbean, every weather observation has multiple purposes**

- Same observation that supports a hurricane warning for a community also supports a pilot's flight planning, an airport's hurricane contingency plan, an air navigation provider's operational decisions, and a government's emergency response

- This is the power of an integrated Multi-Hazard Early Warning **System—one authoritative source of meteorological information serving many sectors**, one coordinated response, and one shared goal: **protecting lives and critical infrastructure,** while building a safer and more resilient Caribbean

Thank you!

CMO Headquarters Unit, www.cmo.org.tt