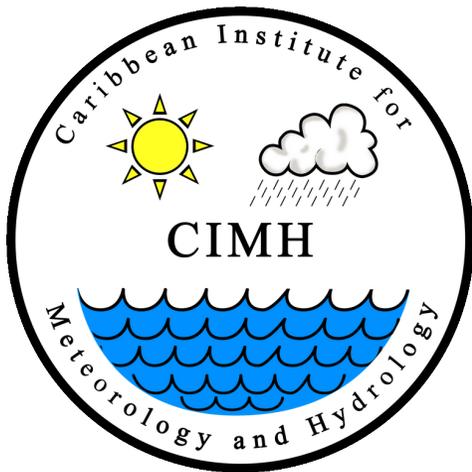


# Climate Services in the Tropical Americas



## The Caribbean Regional Climate Centre at CIMH:

*Enhancing climate risk management and early warning in the Caribbean*

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## Dr. Cédric VAN MEERBEECK

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*Climatologist / Senior Lecturer* – CIMH ([cmeerbeeck@cimh.edu.bb](mailto:cmeerbeeck@cimh.edu.bb))

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*Co-lead* – North & Central America & Caribbean Expert Team on Climate Services (WMO RA IV ET-CLI)



Sub-Commission for the Caribbean and Adjacent Regions

Subcomisión para el Caribe y Regiones Adyacentes

### SC-IOCARIBE-XVIII Technical Science Meeting and Dialogue: “A Warming Ocean”

22 April 2025, 11.00 – 16.30 a.m (Brasilia time)

# Why monitoring & predicting climate as a service?

“a **climate service** is the provision of **climate information** for use in **decision-making.**”

(Hewitt and Stone, 2021)

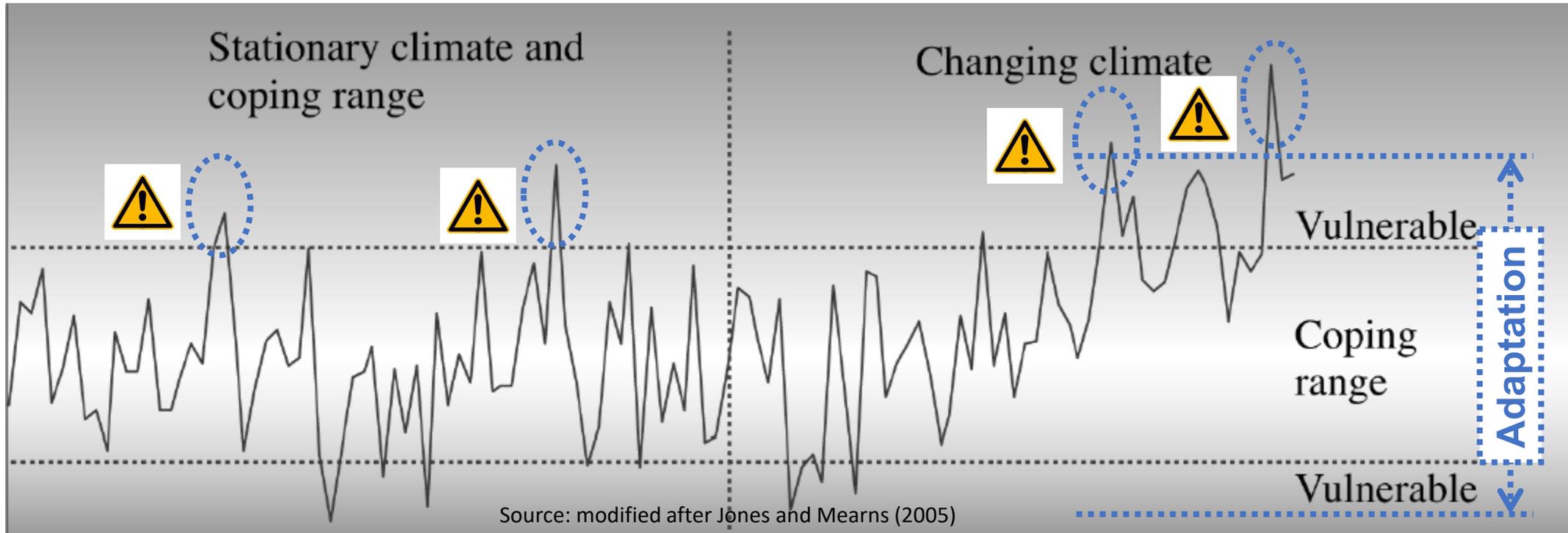


The information is geared to:

- **build resilience** to climate hazards
- **take advantage** of favourable climate conditions

# CLIMATE RISK

What is it? How can early warning information help?



- **Climate risk** arises when **climate conditions** become **extreme** to the point that they exceed our coping range, i.e. they become **hazardous**.
- Climate change **adaptation** is a **long-term risk reduction** strategy aimed at extending our coping range.
- Climate **early warning information** (incl. monitoring & prediction) can help us **prepare** for the risk posed by impending hazards.

# Timescales of Climate Information for Planning and Early Warning

**What's on the horizon?**

**DECADES TO YEARS AHEAD**

**Long-term planning/  
Adaptation**

**AHEAD OF THE SEASON**

**What's next?**

**ALERTING THROUGHOUT THE SEASON**

**Early Warning for Preparedness,  
Alerting & Response**

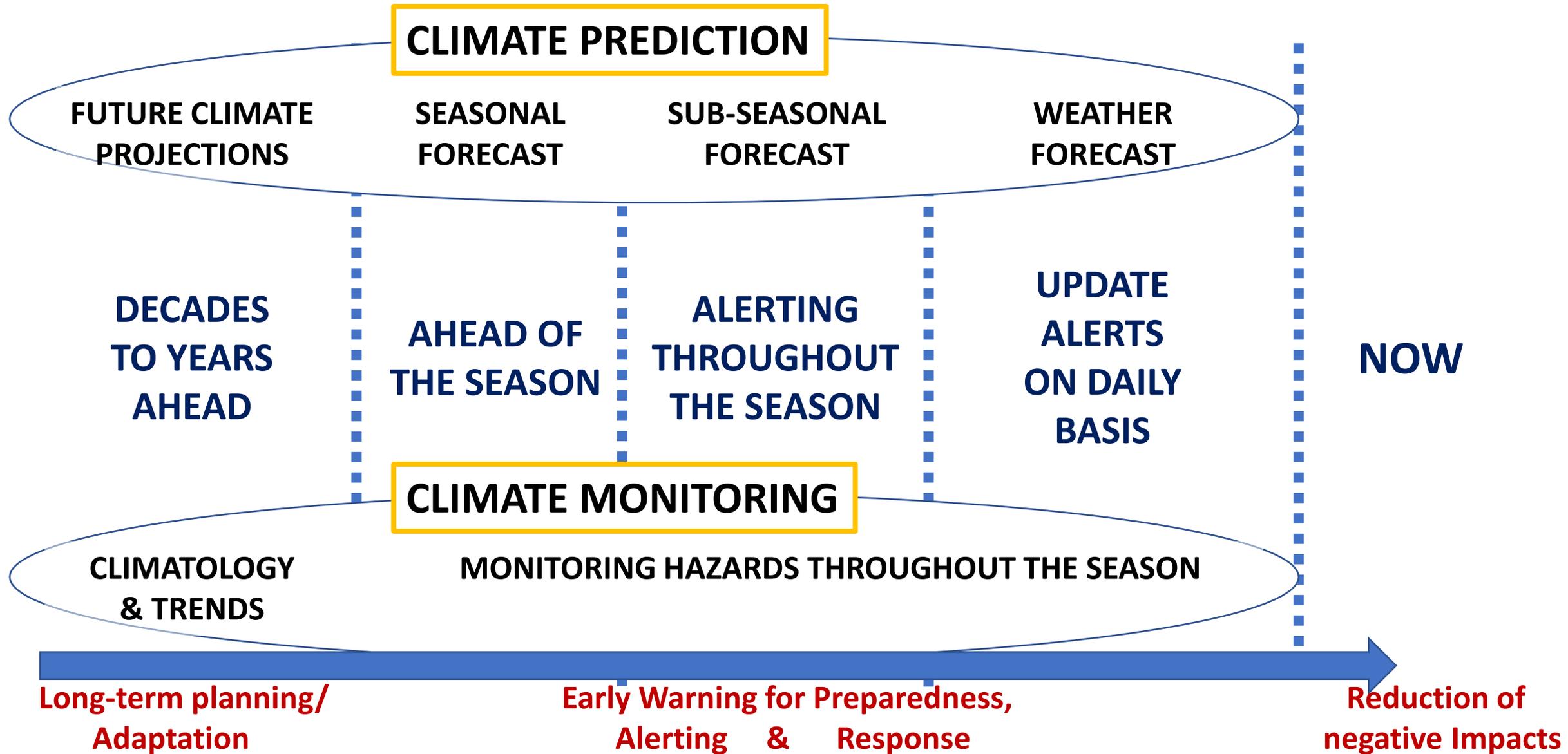
**UPDATE ALERTS ON DAILY BASIS**

**Happening now!**

**NOW**

**Reduction of negative Impacts**

# Timescales of Climate Information for Planning and Early Warning

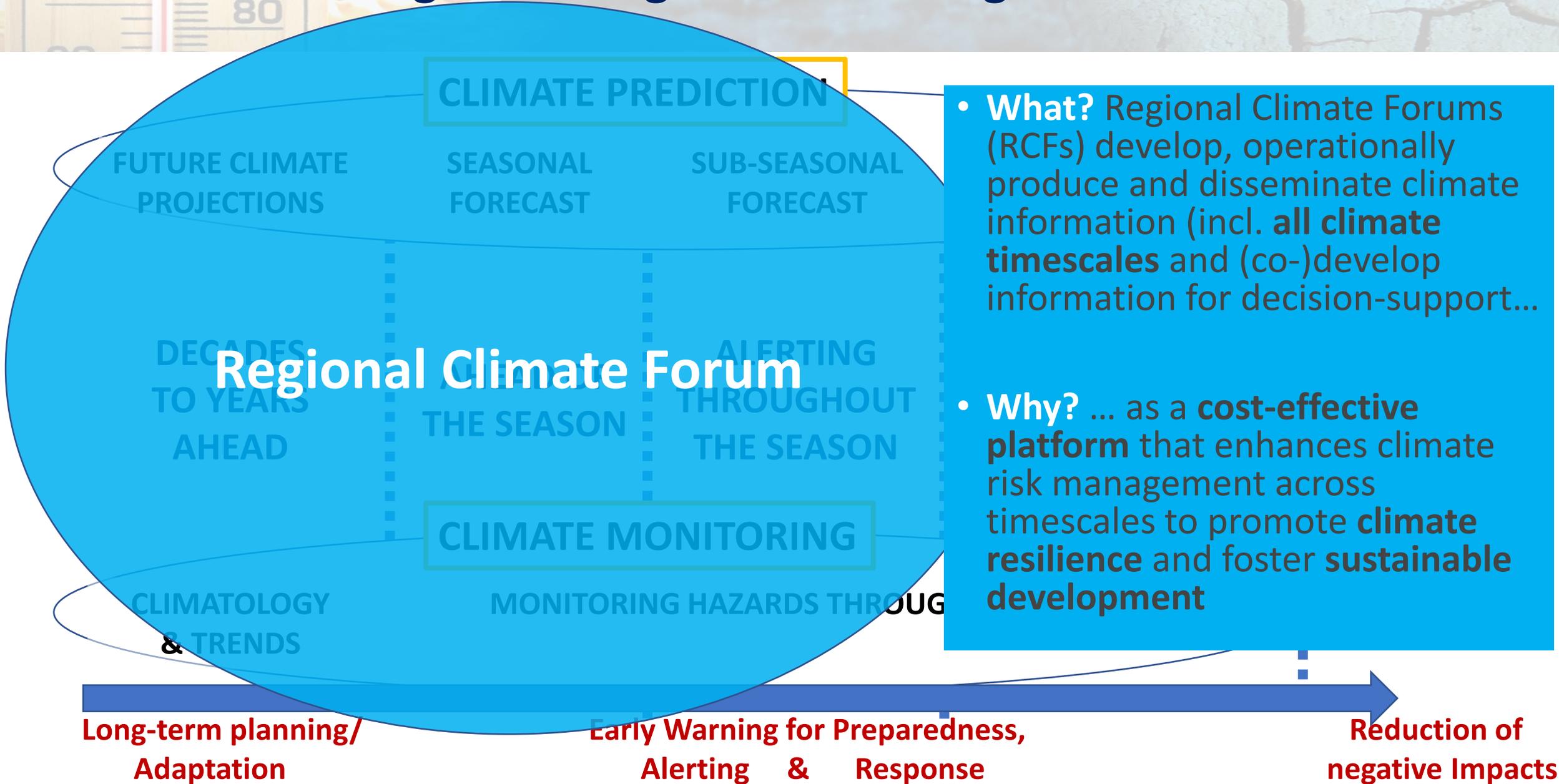


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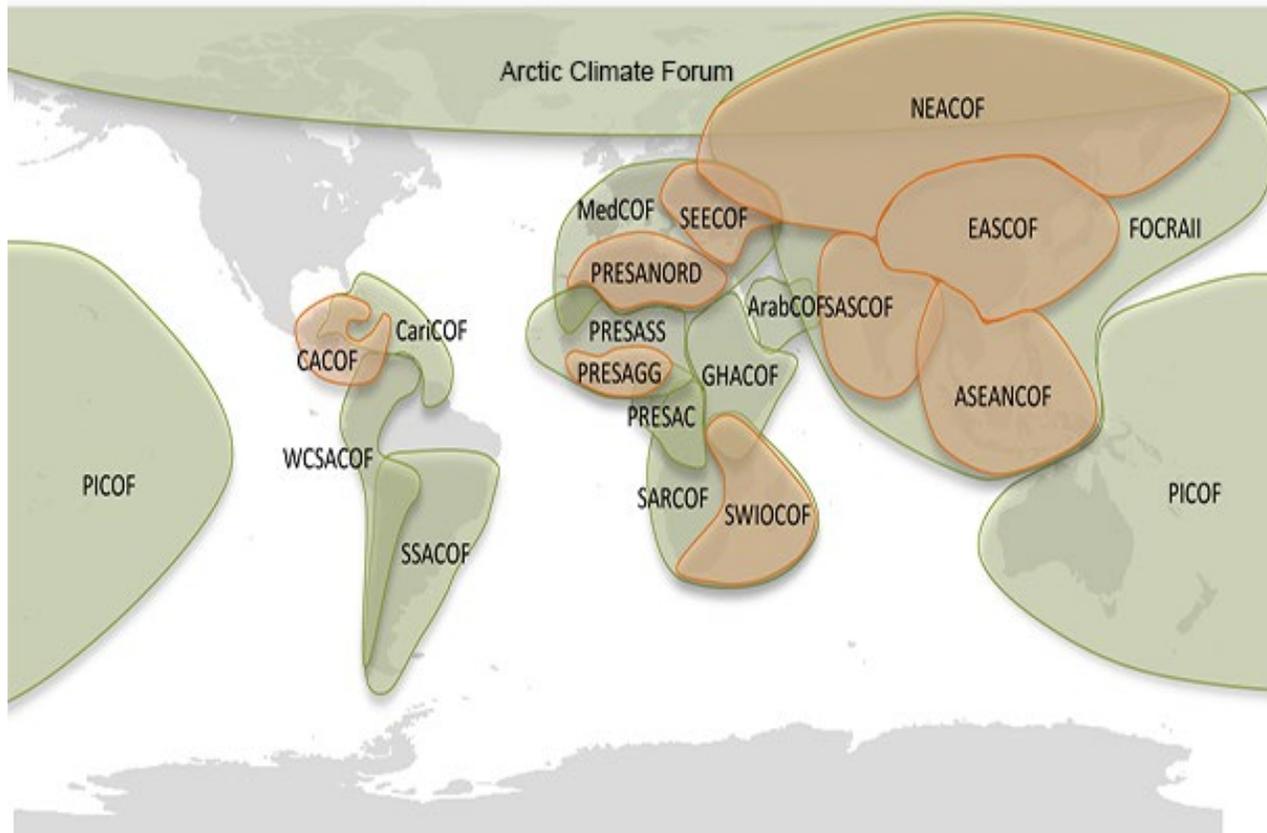
**Supporting regional  
structures of the World  
Meteorological  
Organization (WMO) in the  
Americas**



# User Interfacing at the Regional Level: Regional Climate Forums

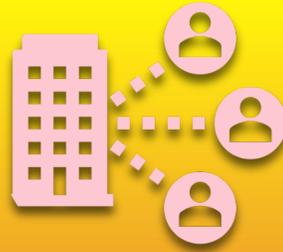


# Regional Climate (Outlook) Forums in the Americas



- ▶ Arctic Climate Forum (ACF)  
<https://arctic-rcc.org/acf>
- ▶ Foro del clima de América Central (FCAC/CACOF)  
[https://www.sica.int/iniciativas/clima\\_san](https://www.sica.int/iniciativas/clima_san)
- ▶ Caribbean Climate Outlook Forum (CariCOF)  
<https://rcc.cimh.edu.bb/caricof/>
- ▶ Western Coast of South America Climate Outlook Forum (WCSACOF)  
<https://ciifen.org/foros-climaticos-regionales/>
- ▶ Southern South American Climate Outlook Forum (SSACOF)  
[https://www.crc-sas.org/en/prevision\\_foro.php](https://www.crc-sas.org/en/prevision_foro.php)
- ▶ more info on RCOFs at:  
<https://public.wmo.int/en/our-mandate/climate/regional-climate-outlook-products>

# The Role of WMO- designated Regional Climate Centres (RCCs)



## Coordination

R & D +  
operation of  
regional **early  
warning**  
information  
systems

**User interface**  
platforms



## Capacity building

**NMHSs** by  
provision of  
climate **data,**  
**tools, products**  
& **training**

Awareness &  
education of  
**sectors & public**



## Catalysing

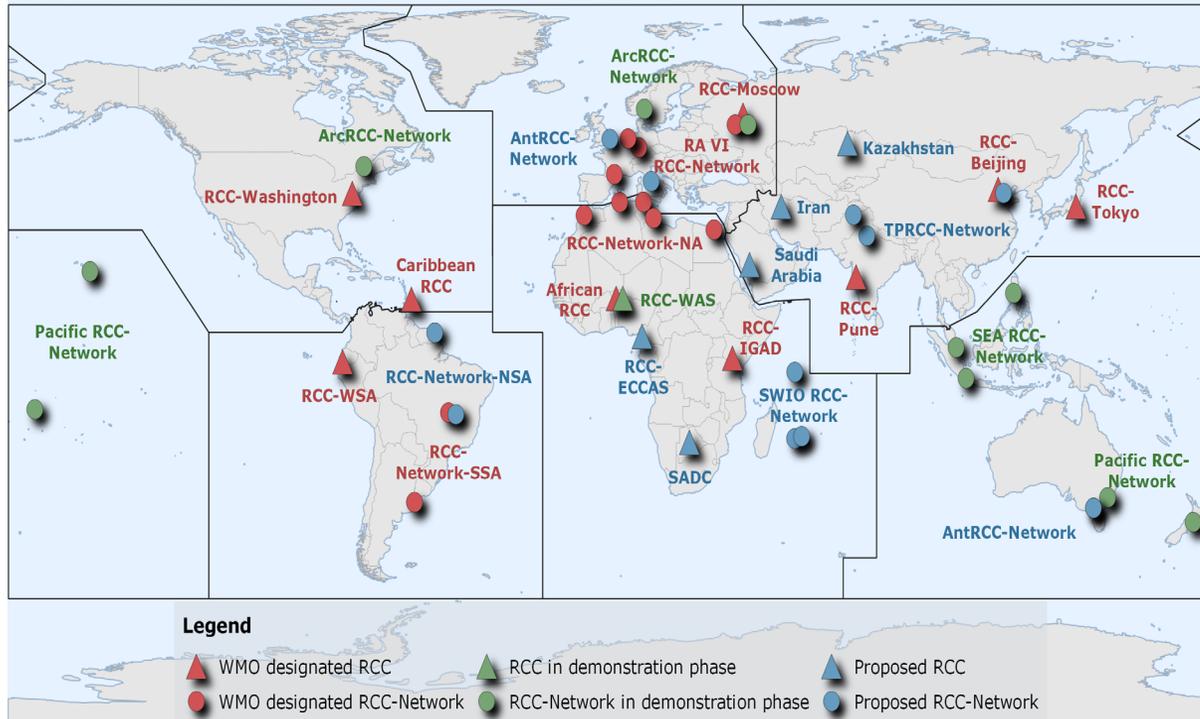
**Co-development**  
& **co-production**  
of climate  
services

**Data &**  
**information flow**  
from GPCs to  
NMHSs



Not certain I completely follow the middle panel

# Regional Climate Centres in the Americas



## ▶ Designated RCCs/RCC Networks

- ▶ Regional Climate Center Washington (**RCC-Washington**)

<https://usregionalclimatecenter.noaa.gov/>

- ▶ Caribbean Regional Climate Centre (**Caribbean RCC**)

<https://rcc.cimh.edu.bb/>

- ▶ Centro Regional del Clima para el Oeste de Sudamérica (**RCC-WSA**)

<https://crc-osa.ciifen.org/>

- ▶ Centro Regional del Clima para el Sur de América del Sur (**RCC-Network-SSA**)

<https://www.crc-sas.org/es/>

## ▶ RCCs/RCC Networks *in demonstration phase*

- ▶ Arctic Regional Climate Center Network (**ArcRCC-Network**) *in demonstration phase*

<https://arctic-rcc.org/>

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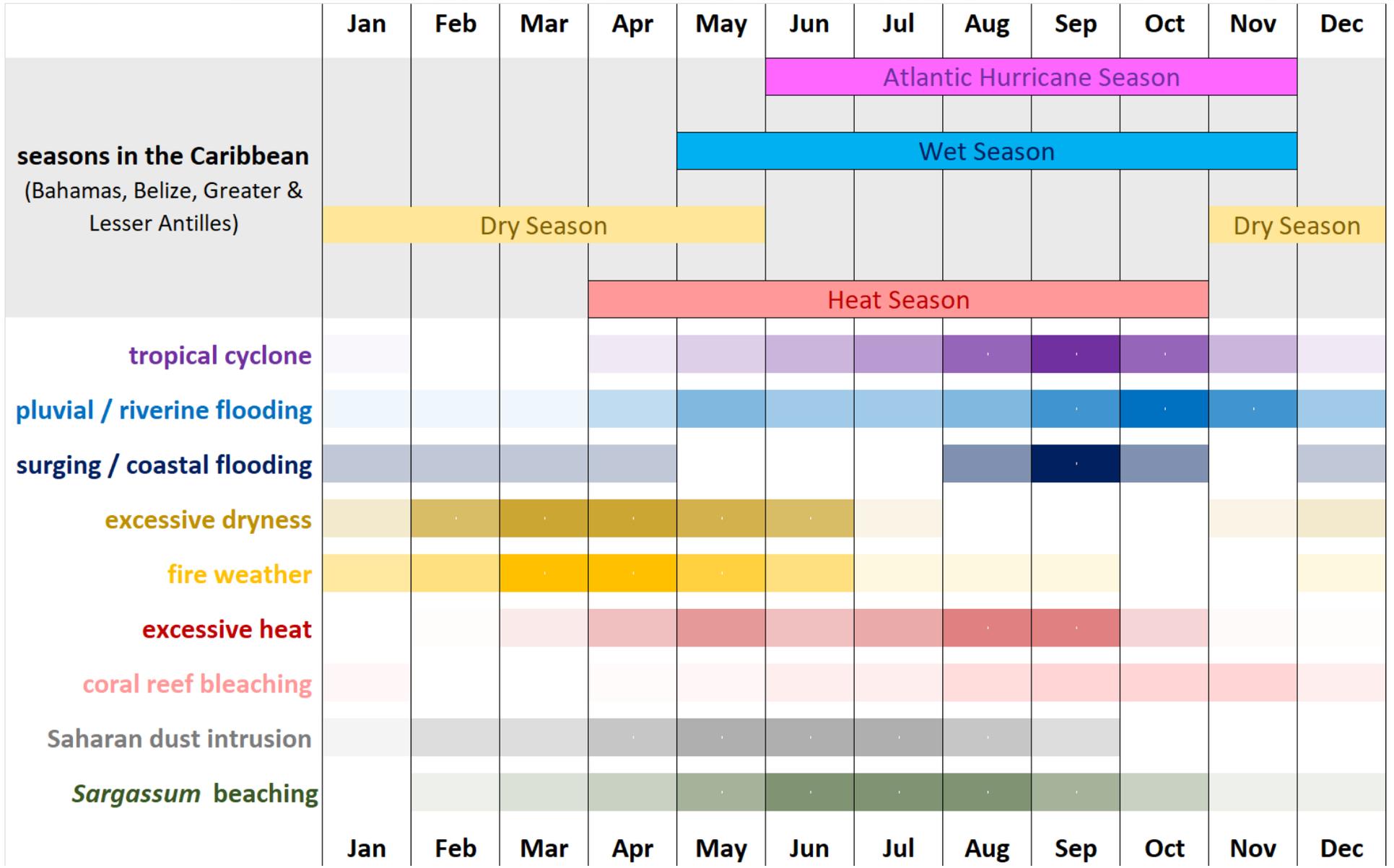
**Examples of climate services provided or brokered by the Caribbean RCC to our partners in support of ocean governance**



# Risk knowledge – Climatological seasonality of hazards

(see the inserted arrow)

↑  
hazard frequency

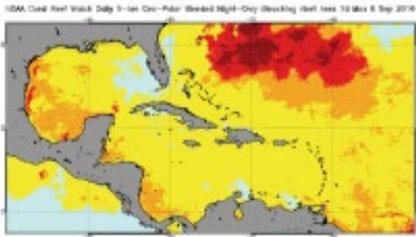


tropical cyclone activity  
 fire weather  
 Saharan dust intrusion

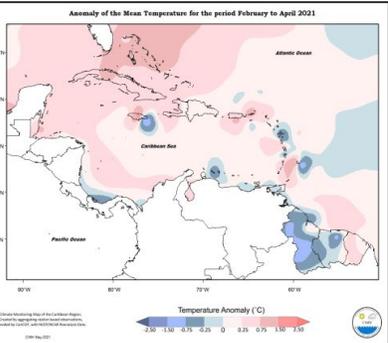
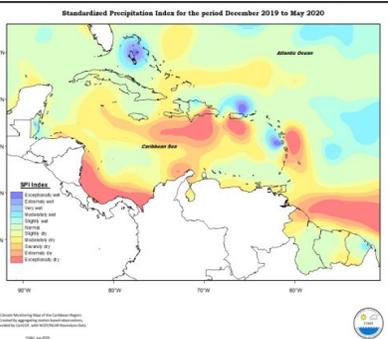
extreme rainfall / flooding  
 excessive heat  
 Sargassum beaching

excessive dryness  
 coral reef bleaching  
 coastal flooding

# CLIMATE MONITORING



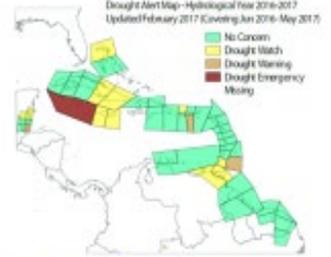
Alert Level	Interpretation
No Stress	No Thermal Stress
Watch	Low-level thermal stress
Warning	Thermal stress is accumulating
Alert level 1	Wetting required
Alert level 2	Widespread wetting and some recovery required



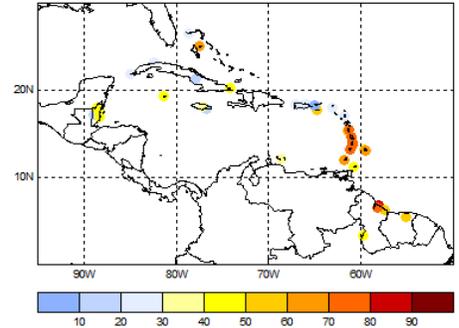
# CLIMATE OUTLOOKS

### Extreme wet spells frequency shifts Forecast for March to May 2017

**USUALLY:** Up to 1 extreme wet spell occur between March to May (ABC Islands 0).  
**FORECAST:** FMA rainfall is likely to be above- to normal in much of the region, but below- to normal in Belize, Cayman and Cuba. No significant change in the total amount of wet days, with very wet or extremely wet spells (see conditions are expected, except for an increase in Barbados, the Windwards and Guyana (due to medium confidence).  
**IMPLICATION:** Flash flood potential not a major concern until the end of April.



Prob. at least 15 heatwave days between Aug & Oct 2021



### Min. and max. temperatures up to May

Minimum Temperature Outlook MAM 2017  
 Maximum Temperature Outlook MAM 2017

Confidence (in %) for temperature to be:  
 Below-normal Normal Above-normal

MAM min. & max. temp. in the Caribbean are likely to be above- to normal.

# REGIONAL BULLETINS

## CARIBBEAN DROUGHT BULLETIN

October 2017 | Volume IV | ISSUE 5

**Announcement**  
 Recent and forecasted conditions suggest some concern over the amount of rainfall over the next several seasons. Particular concern from November 2017 into 2018. Conditions over the next several months. There is the concern about drought over the remainder of the season.

**Month at a Glance**  
 Normal to above normal rainfall was experienced over the month of October. In the Caribbean, the amount of rainfall was above normal for the first time since 2014. This is a positive sign for the region. However, the amount of rainfall was below normal in the Windwards and the Cayman Islands. The amount of rainfall was below normal in the Windwards and the Cayman Islands. The amount of rainfall was below normal in the Windwards and the Cayman Islands.

**July-August-September**  
 The amount of rainfall was above normal for the first time since 2014. This is a positive sign for the region. However, the amount of rainfall was below normal in the Windwards and the Cayman Islands. The amount of rainfall was below normal in the Windwards and the Cayman Islands.

**Latest News**  
 Please see that the heat index and the heat index is above normal. The amount of rainfall was above normal for the first time since 2014. This is a positive sign for the region. However, the amount of rainfall was below normal in the Windwards and the Cayman Islands.

# NATIONAL BULLETINS

## BCON

BMS Monthly Climate Outlook Newsletter  
 March 2020 - Volume 11 - Issue 3

**Key Messages:** Below normal rainfall expected for the period of the first half (June to August) of the long term. Heat is expected. Energy production continues to reduce drought conditions. The outlook for drought remains to be seen. There are some areas that have been identified for the next several months.

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## MetService - NOAA

Small Print: May 15, 2020  
 Vol 11 Issue 01

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### 2021 Atlantic Hurricane Season Activity CIMH forecasts

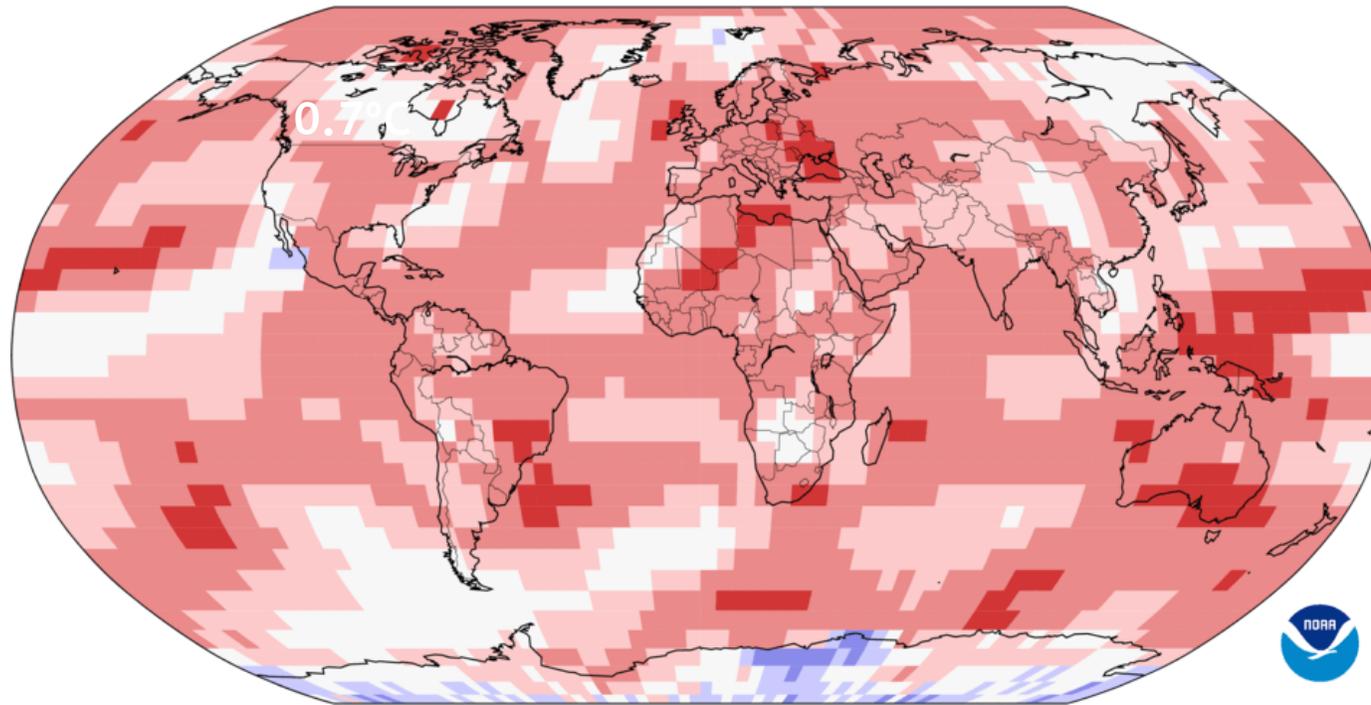
Period	1991-2020	Forecast	Range*	Confidence level
<b>Number of Named Storms</b>				
Entire season	14	18	14-22	High
First half (JJA)	5	7	4-10	Medium
Peak season (ASO)	11	13	10-17	High
Second half (SON)	7.8	10	7-13	Medium
<b>Accumulated Cyclone Energy (ACE)</b>				
Entire season	122	156	97-217	Medium
JJA 2020	29	37	9-65	Low
ASO 2020	114	135	81-189	Low to medium
SON 2020	87	117	72-163	Medium

Through partnerships (*mainly with NOAA*), the Caribbean RCC monitors ocean temperature / heat content in the Atlantic and Pacific, which drives our climate variability and fuels extremes

### Land & Ocean Temperature Percentiles Mar 2025

NOAA's National Centers for Environmental Information

Data Source: NOAAGlobalTemp v6.0.0-20250406



Record Coldest

Much Cooler than Average

Cooler than Average

Near Average

Warmer than Average

Much Warmer than Average

Record Warmest

**Tropical Pacific:**

Right now:

**LA NIÑA faded**

This summer:

*likely*

**ENSO neutral**

**Tropical Atlantic:**

Right now:

**unusually warm**

This summer:

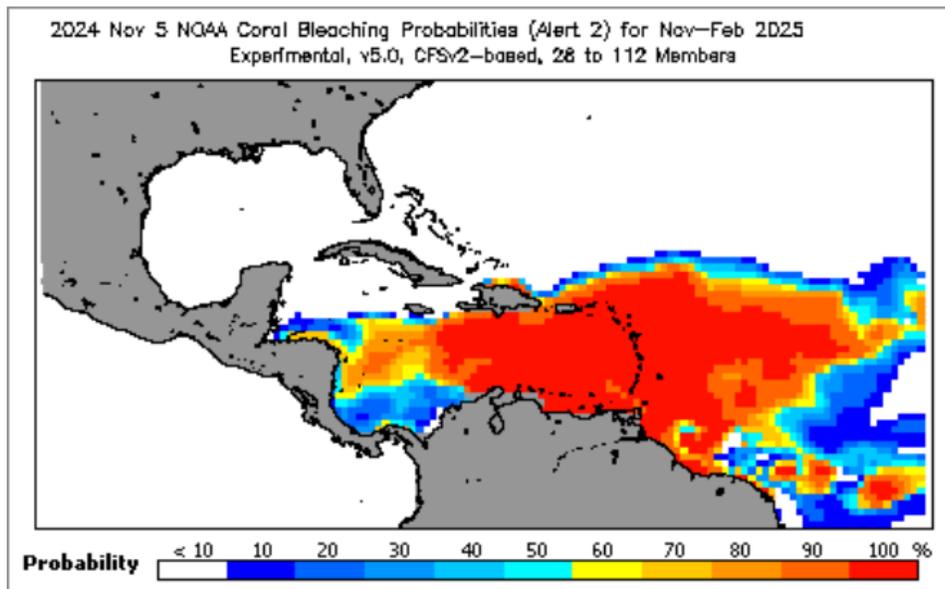
**unusually warm**



In partnership with the Global Coral Reef Watch, the Caribbean RCC issues the **Caribbean Coral Reef Watch Bulletin** every month when SSTs are warm enough to impose heat stress on our reefs.

## Caribbean Outlook (Nov. 2024 - Feb. 2025)

- ▶ The 4-Month Probabilistic Outlook of November 5 predicts, with a high probability, that heat stress will continue to exceed Alert Level 2 in the central and eastern Caribbean basin, into November, and late December for the southeastern portion of the basin.



## *Caribbean Bleaching Outlook*

As of November 5, 2024, NOAA CRW's 4-Month Coral Bleaching Outlook (90% probability)

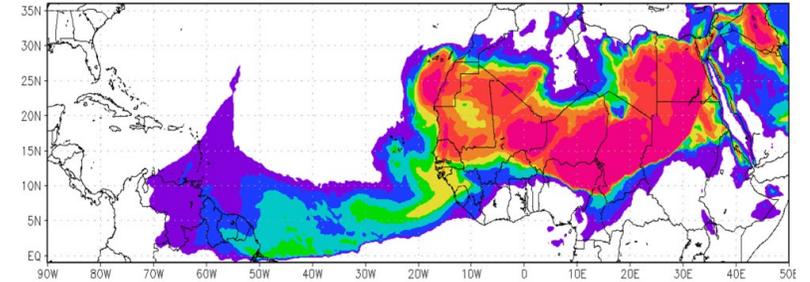
indicates that Alert Level 2 and higher heat stress, already encompassing most of the basin, will begin to dissipate in the next 1-4 weeks and will continue this trend. The high heat stress will remain in mostly southern areas into early December, before dissipating completely in January.

**NOTE:** alerts are not uniform across the basin.

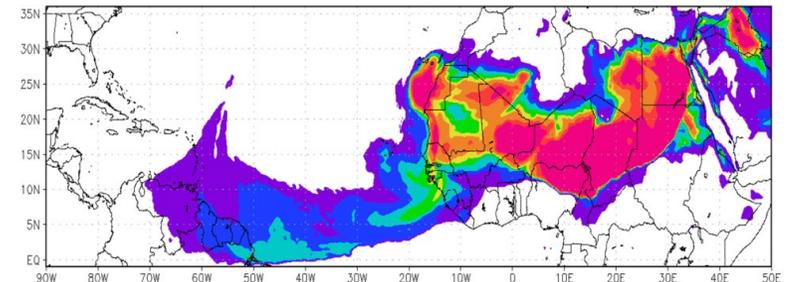
# Dust and Air Quality Forecasting for the Caribbean

- **Saharan dust incursions affect our oceans and seas:**
  - fertilization of the surface waters,
  - oceanic heat accumulation,
  - wind-driven current speeds,
  - SSTs and SSS (incl. through changes in vertical mixing, solar radiation, evaporation/precipitation rates)
- **CIMH - WMO Sand & Dust Storm Warning Advisory & Assessment System (SDS-WAS) Pan-American Regional Center**

Surface PM10 Concentration ( $\mu\text{g}/\text{m}^3$ ) Valid 00Z 29/03 2018



Surface PM2.5 Concentration ( $\mu\text{g}/\text{m}^3$ ) Valid 00Z 29/03 2018



In principle, you could also add volcanic ash although it is a much less frequent occurrence ... we have figures that I can share from the modeling for La Soufriere

# Keep yourself updated !!

Our bulletins aim to offer digestible overviews of recent and forecasted climate conditions and their implications for the Caribbean

## CariCOF Climate Outlook Newsletter

<http://rcc.cimh.edu.bb/long-range-forecasts/caricof-climate-outlooks/caribbean-climate-outlook-newsletter/>

Alert Level	Interpretation
No Stress	No Thermal Stress
Watch	Low-level thermal stress
Warning	Thermal stress is accumulating
Alert level 1	Bleaching expected
Alert level 2	Widespread bleaching and some mortality expected

## Caribbean Coral Reef Watch

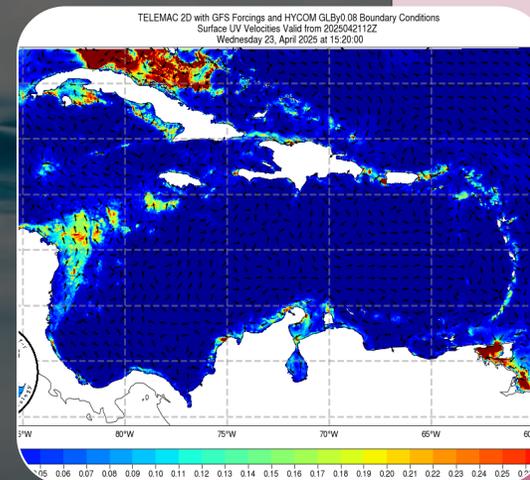
<http://rcc.cimh.edu.bb/climate-bulletins/coral-reef-watch/>

Feel free to highlight other products we can build with the marine community including the fisheries community

# Coming up next from CIMH: Integrating Marine Forecasting products into Climate Services

Caribbean  
Regional Climate  
Centre

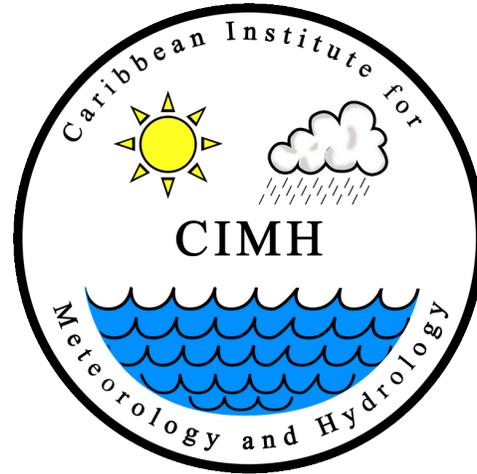
Marine  
Forecasting  
Support Centre



Forecasts of

- Sea Surface Height / Free Surface (HYCOM/Telemac2D)
- Ocean Current UV speed
- SST, SSS
- Significant Wave Height (WaveWatch3)
- etc.

CIMH welcomes ideas & requests for products & services delivery / brokerage



**For climate monitoring information, climate outlooks and climate bulletins pertaining to the Caribbean, please visit:**

**[rcc.cimh.edu.bb](http://rcc.cimh.edu.bb)**

**Additional early warning tools for the Caribbean are found at [www.cimh.edu.bb](http://www.cimh.edu.bb)**

***Thank you***