Implementation of objective seasonal forecasts - in Africa, Caribbean and Pacific

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WMO

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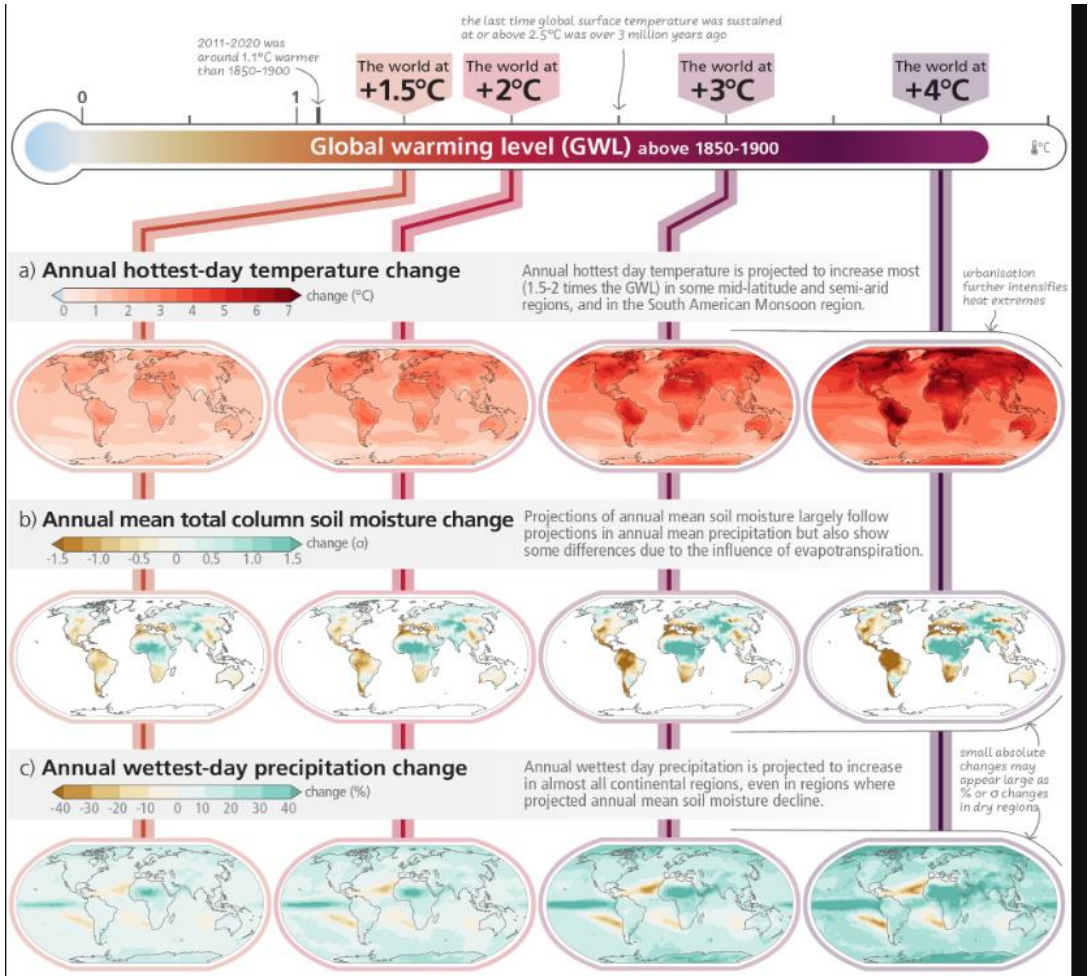
IMO-WMO

Climate information supportting decision making

(SPM2, IPCC AR6 SYR, 2023)

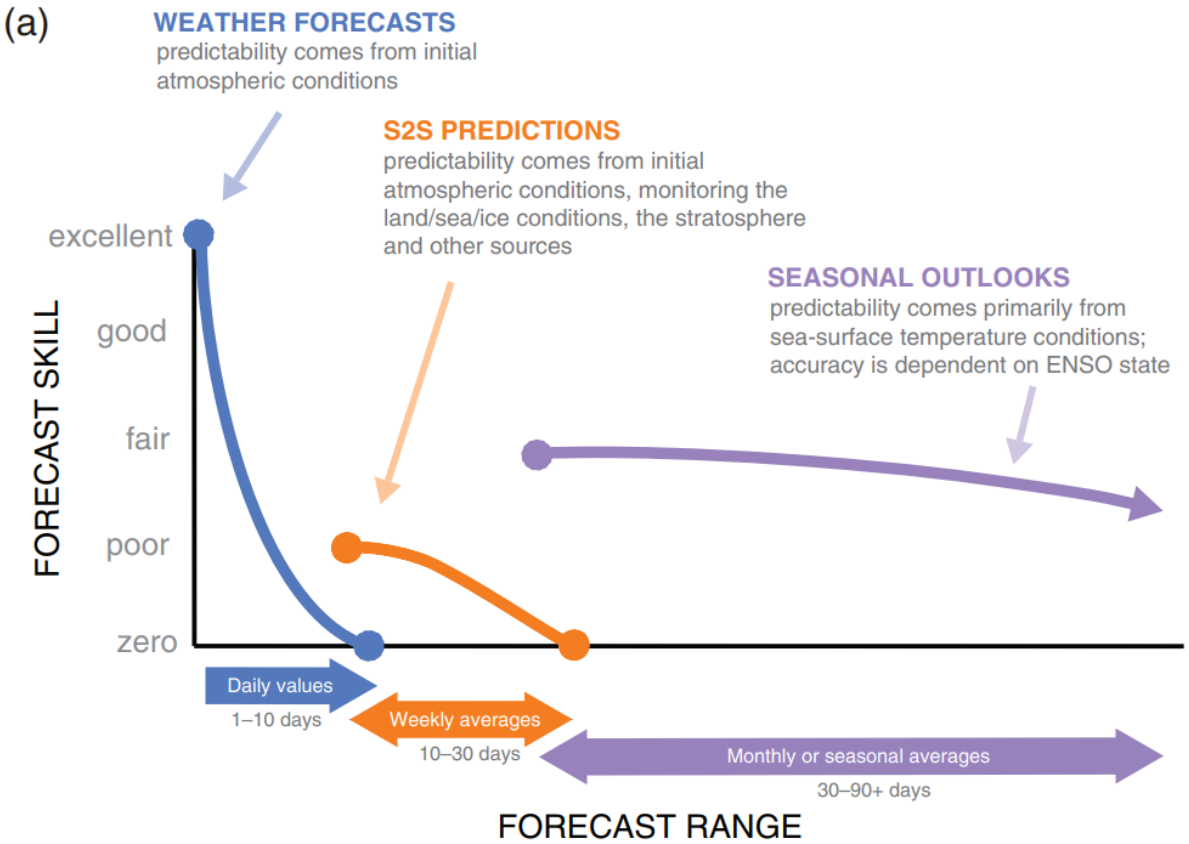
- **Demand for climate information and services** to inform decision- and policymaking is growing
- Climate impacts, related losses and damages and climate-related risks **escalate with every increment of global warming**
- Climate resilient development is enabled by increased international cooperation including **improved access to climate information and services**
- Various types of users are seeking tailored and actionable climate information on **a wide range of space and time scales**, from past, current and future climate



Climate prediction revolution

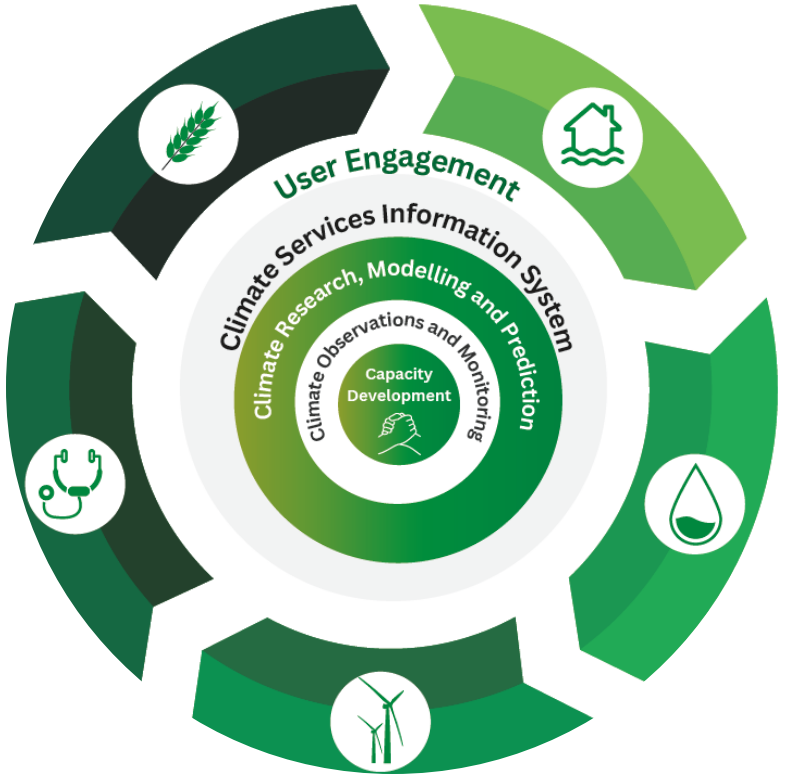
While et al., 2017, Meteorol. Appl. 24:315–325

- **Probabilistic statement** about future climate conditions on different time (months to years) and spatial (global, regional or local) scales.
- **Building on advances** in the understanding of physical processes, climate modelling, observation technology and high-performance computing
- **Work mode in 2010:** A single climate scientist can understand and predict fluctuations of the whole Earth system using model data stored locally
- **Work mode in 2020:** A single climate scientist cannot anymore understand and predict fluctuations of the whole Earth system using model data stored locally



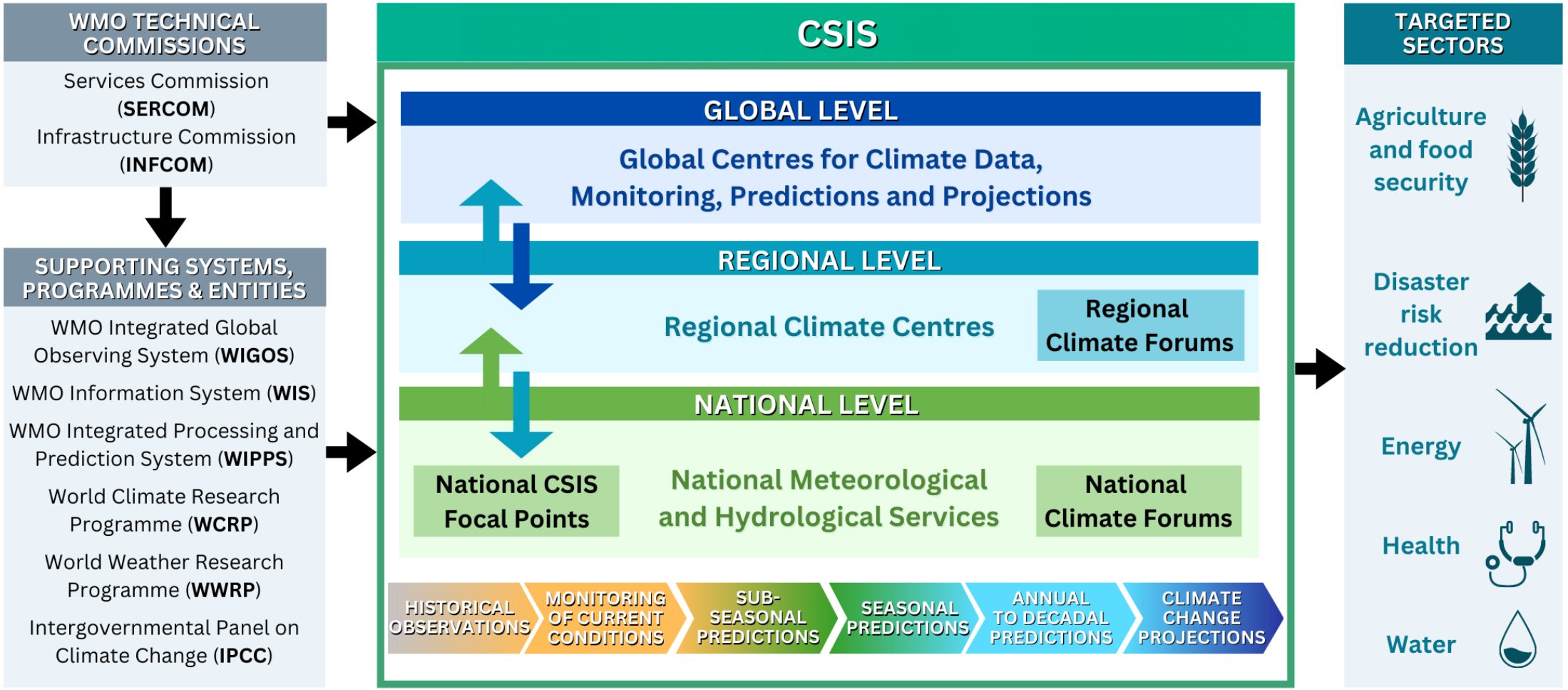
Climate Services Information System (CSIS)

CSIS is the **operational core** of the **Global Framework for Climate Services** that supports the **production** and **delivery** of climate information at **global, regional and national levels**, spanning all **climate time scales** to aid policy and decision-making.



GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

WMO strategy for CSIS implementation



Regional entities supporting CSIS - RCCs

Centres of Excellence that create regionally-oriented products serving primarily countries (NMHSs)

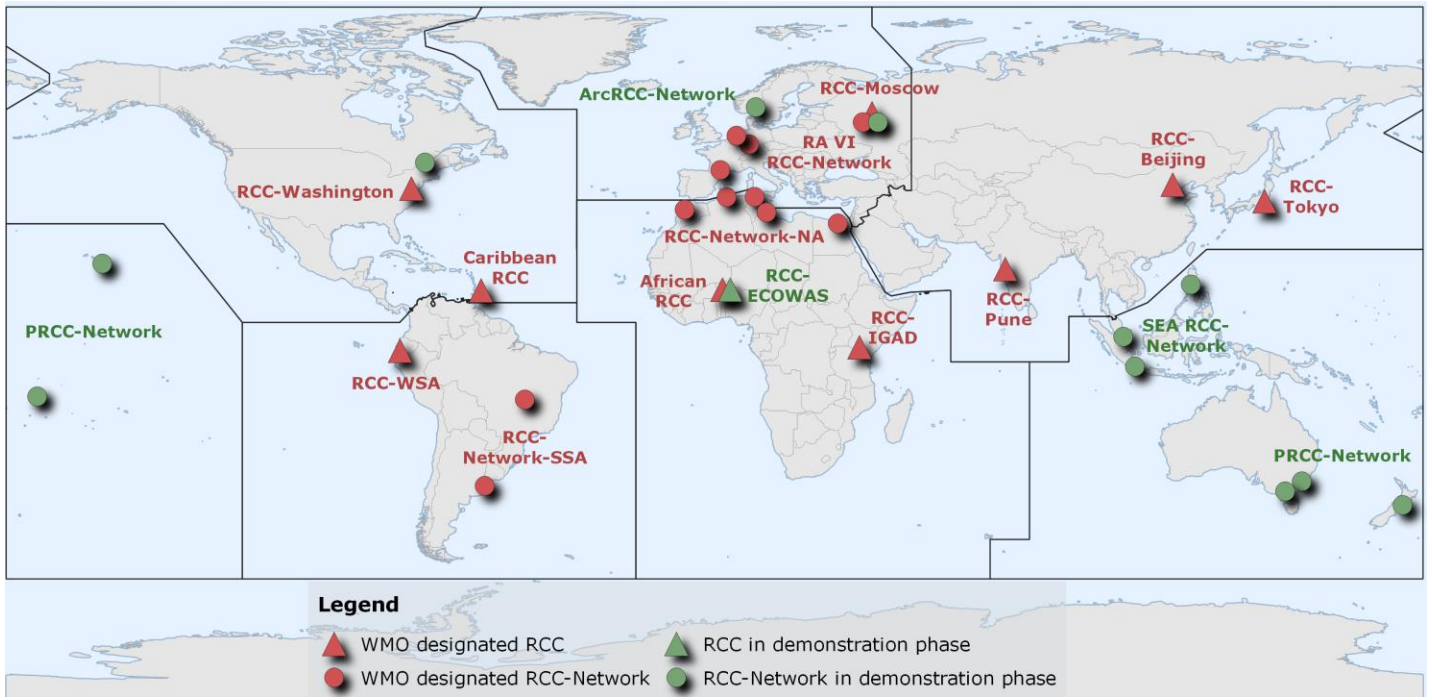
Mandatory functions

- Long-Range Forecasting
- Climate monitoring
- Data services
- Training

Highly recommended functions

- Climate prediction and projection
- Non-operational data services
- Coordination
- Training and capacity building
- Research and development

RCC operations must be consistent with the WMO Information System (WIS) standards.



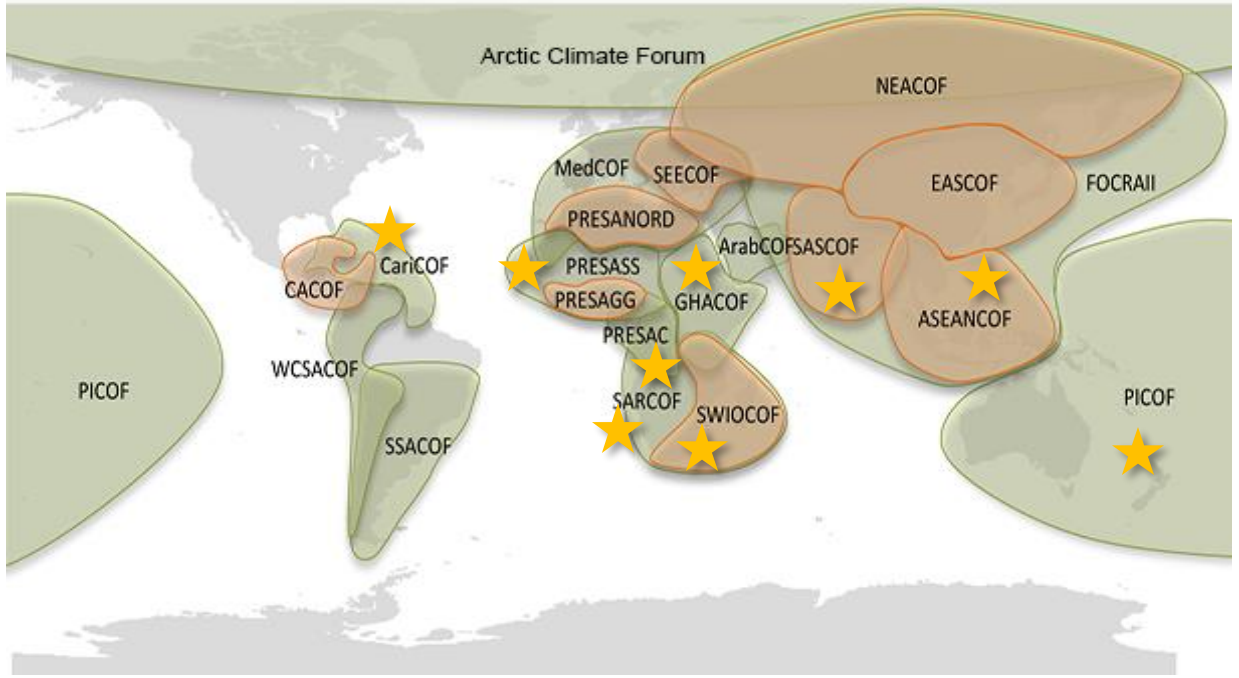
16 WMO Regional Climate Centres and Regional Climate Centre-Networks

Operationalization of objective seasonal forecasts and tailored products

Decision 9 (EC-72), 2020

- Foster transition from consensus-based seasonal outlook of RCOF into **traceable, reproducible and verifiable objective seasonal predictions**
- **Strengthen CSIS and capacity of RCCs and NMHSs** to provide routine objectively based seasonal forecasts
- Provide **tailored forecast products** addressing variables and thresholds relevant to specific user constituencies

Decision 9 (EC-72) offers an opportunity for RCCs to closely work with the research community

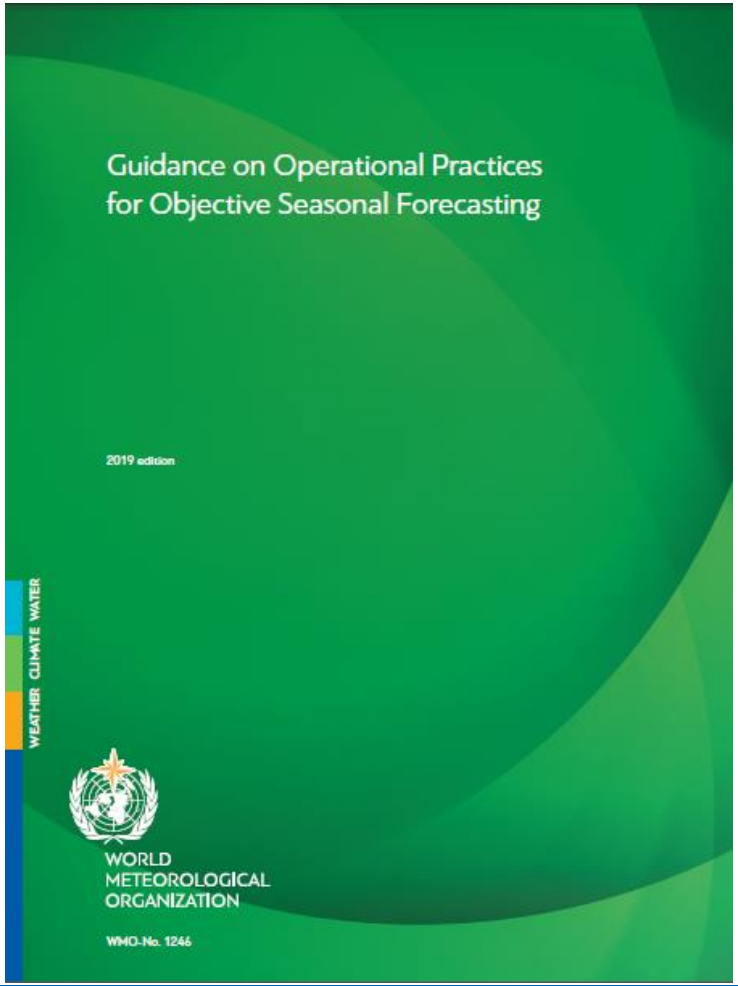


WMO Regional Climate Outlook Forums implementing objective seasonal forecasts

Methodology for objective seasonal forecasts

Use dynamical **climate models, including multi-model ensembles**

1. Establish quality controlled regional observational databases for forecast verification
2. Global forecast data access including an improved understanding of climate variability and predictability
3. Global model evaluation and selection
4. Regional calibration and bias correction
5. Regional Climate Outlook statement
6. Tailored seasonal forecast products
7. Forecast Schedules and Updates
8. Quality Management

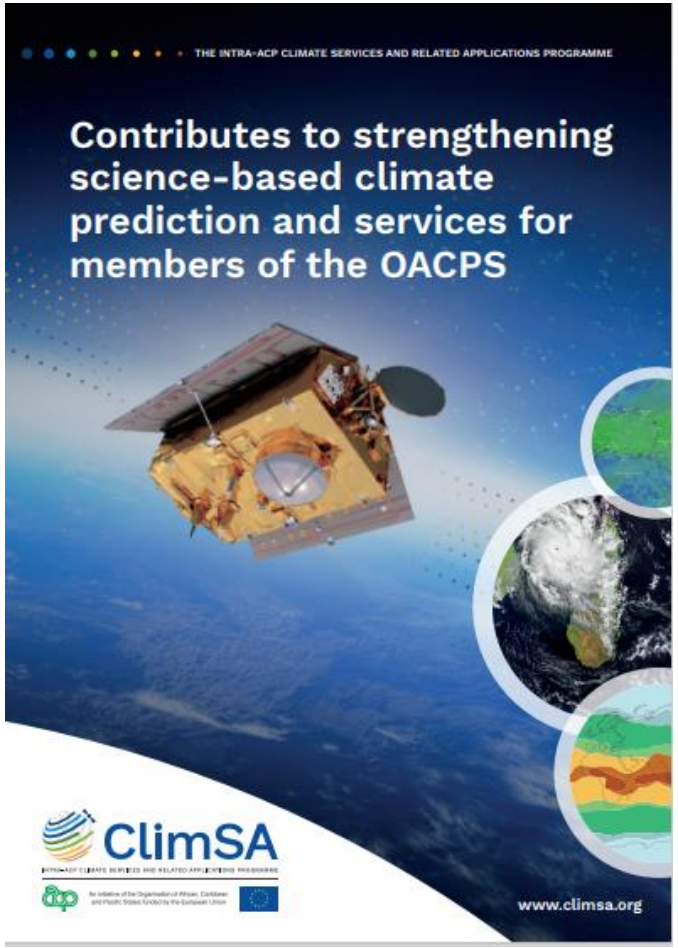


Intra-ACP climate services and related applications (CLIMSA)

A **EUR 85 M initiative** of the Organization of African, Caribbean and Pacific States (OACPS), 79 Members

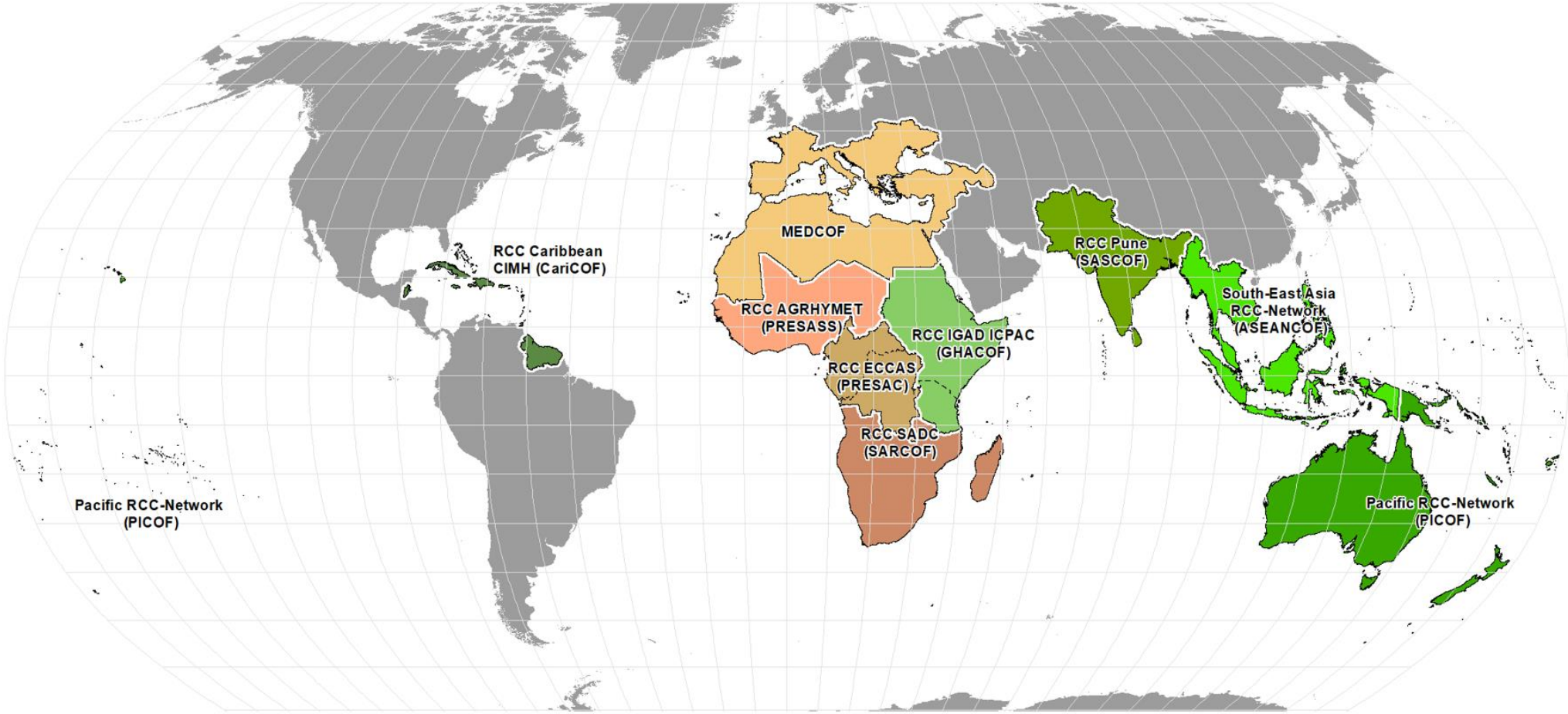
1. **Interaction between the users, researchers and climate services providers** in ACP regions is structured
2. **Provision of climate services** at Regional and National level is effectively guaranteed and secured
3. **Access to Climate Information** is improved
4. **Capacity of ACP regions is enhanced** to generate and apply climate information and products relevant to their particular concerns
5. **Climate-informed decision-making is enhanced,** and climate services are mainstreamed into policy processes at regional and national levels

WMO works on **provision of climate services at regional and national scales through strengthening the implementation CSIS**



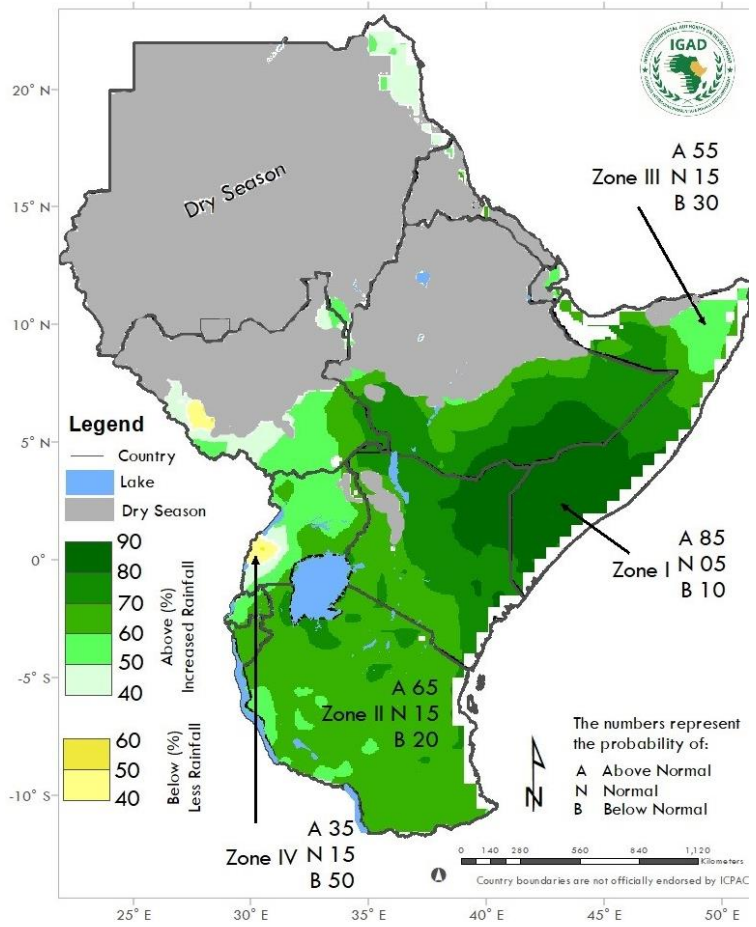
Regional guidance for production of objective seasonal forecasts

Recommendations to guide the development of objective seasonal forecasting activities in RCCs



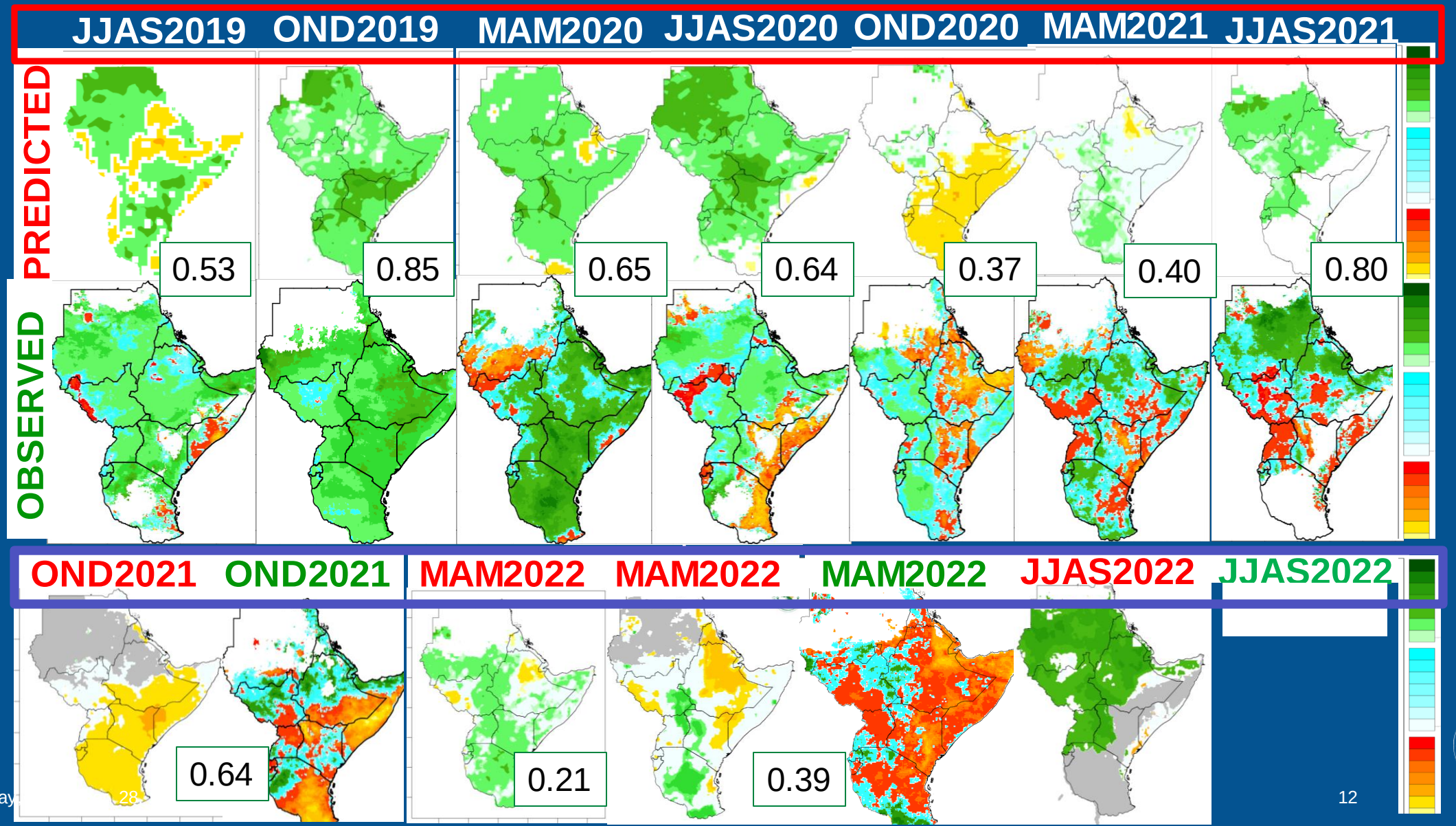
Recommendations for the Greater Horn of Africa (GHA) region

1. **Cataloguing and documentation of GHA climate variability and drivers of variability**
   - Real-time monitoring of 2-metre temperature
   - Explore the usefulness of monitoring other potential drivers (other than ENSO and IOD) that can provide additional insights into climate forcing
2. **Access and use of global dynamical model forecast outputs**
   - Prepare a strategy for developing and harmonizing the GCM-based system for predicting seasonal means and totals and the WRF-based system for predicting sub-seasonal characteristics
   - Assess the skill of smaller sets of the more skillful models against the current 10-model benchmark
   - Prepare for implementation of sub-seasonal forecasts
3. **Test other calibration approaches**
4. **GHACOF outlook statement, its communication and verification**
   - Use probabilistic language
   - Reflect forecast skills and usereal-time verufication measures
5. **Develop a coproduction strategy** for tailored products of priority regional hazards



October-December (OND) 2023 RAINFALL OUTLOOK

Objective Forecasting: Reproducible, traceable, verifiable, calibrated, digital products -- https://www.icpac.net



ICPAC

Recommendations for the Caribbean region

- Appointment of a **steering committee comprising NMHSs and sector stakeholders** to prioritize and track CariCOF's technical progress.
- **Improvements in the process and methods of seasonal forecasting**, including (i) iadditional predictors in multi-model ensembles; (ii) operationalizing quantitative forecast verification; (iii) selection of GPC-LRF models based on skill; (iv) using of generalized linear regression models for statistical downscaling; (v) improving the coverage and quality of predictand datasets; and (vi) further IT automation.
- **Priority training needs** for (i) technological and procedural capacity development within the climate services provider community and (ii) interpretation, application and mainstreaming of climate information within the sectoral user community.
- **Enhancing the sustainability of the operations**, including on (i) increased budget allocations for training; (ii) technical support platforms for NMHSs; (iii) sharing resources across institutions; (iv) catalyzing financial and human resource allocation for climate services within NMHSs.
- **Improvements the region's capacity to co-develop prioritized and tailored** climate information products and services through synergistic approaches, by continuing (i) the development of sub-seasonal to seasonal prediction capabilities; (ii) regional climate capacity building among the providers and users of climate information products and services; (iii) campaigning for and building of systematic datasets of climate impacts to enable impacts-based seasonal forecasting.

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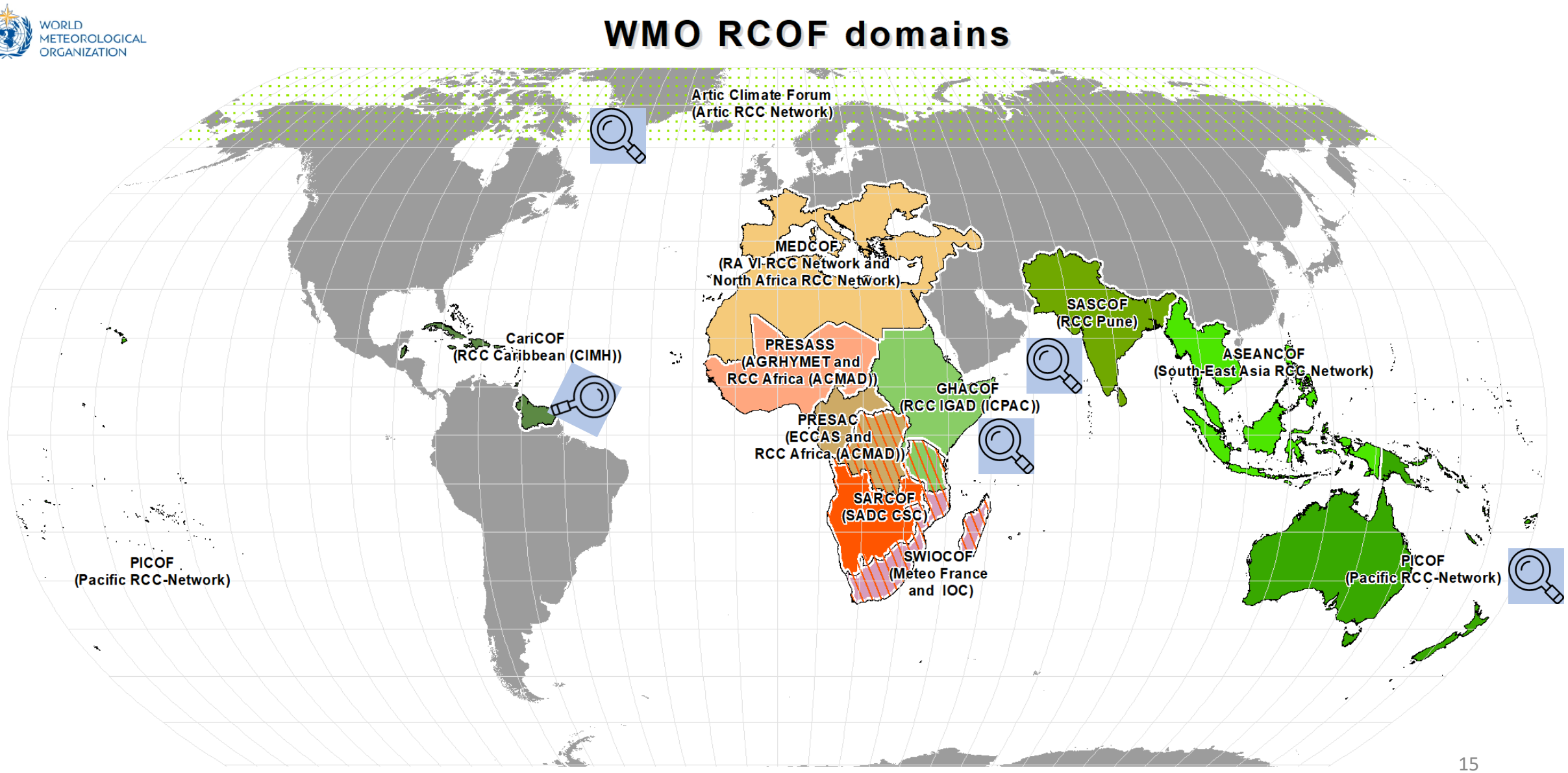
Progress and ongoing efforts

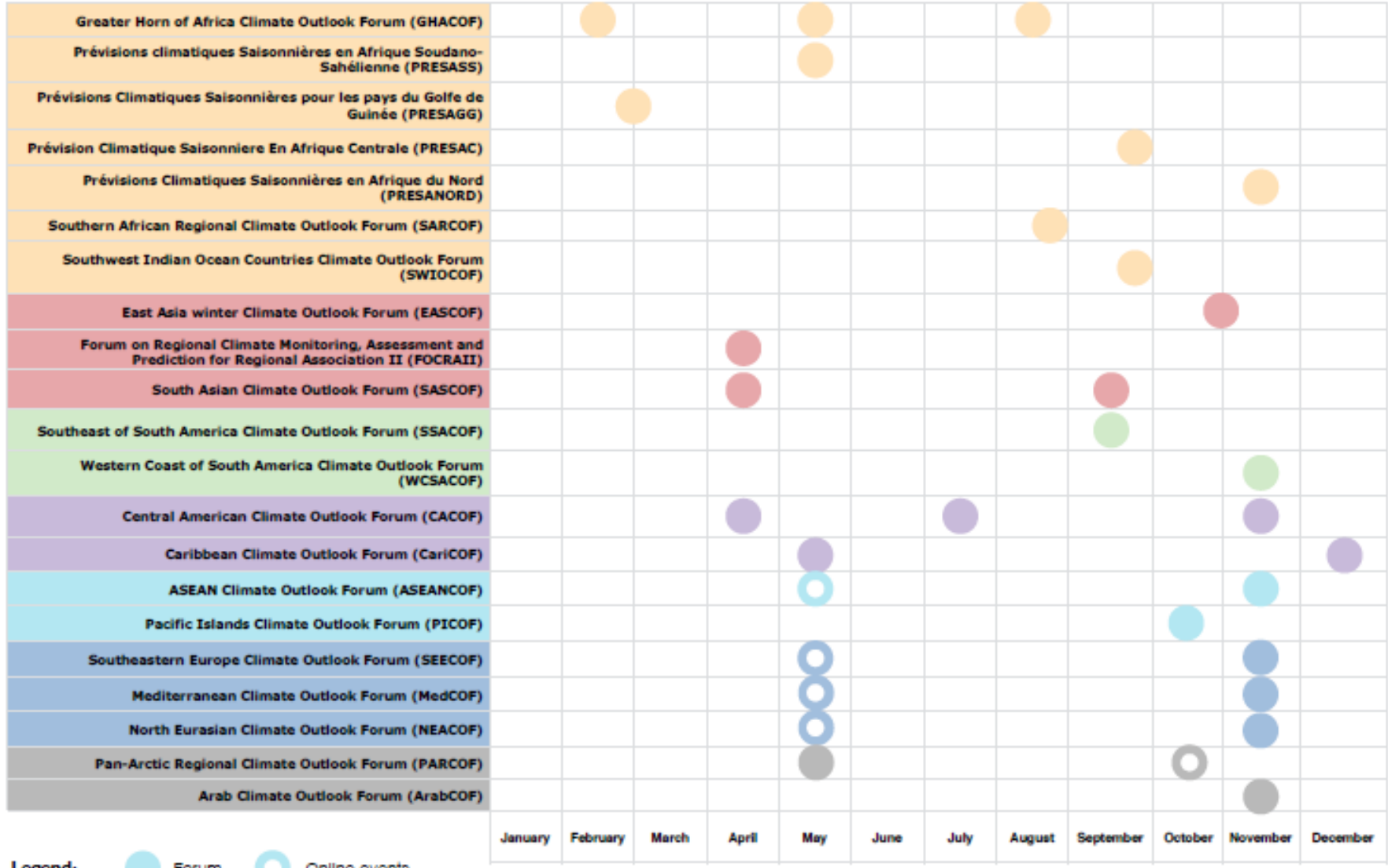
WORLD METEOROLOGICAL ORGANIZATION



Recommendations for the Mediterranean region

- Delivery of ensemble datasets including their previous correction and calibration and some strategy for their combination
- Criteria and metrics for models selection will be a priority task to be agreed and coordinated with North African and RA VI RCC LRF nodes and sub-regional RCOFs.
- An initial option to make the selection of models among the 8 C3S models. In successive releases of the procedure for generating MedCOF OSFs additional models from the WMO LRF MME pool could be added
- Consider the large-scale fidelity of simulations as criteria for selection, it is advisable to select models based on an analysis of their ability to simulate climate drivers, climate variability patterns and teleconnections that are relevant at a seasonal scale over the region of interest
- Historical performance of MedCOF objective seasonal forecast, based on hindcast with a sufficient number of years and members, should be computed following standard verification procedures (WMO 2018) and made accessible to users together with the forecast itself.
- Leverage on the operational implementation of research results obtained from the MEDSCOPE initiative

REGIONAL CLIMATE OUTLOOK FORUMS



Legend: Forum Online events

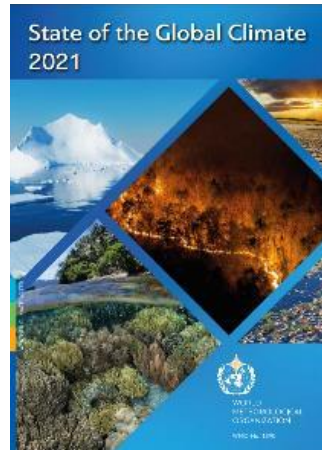
RA I: Africa
RA II: Asia
RA III: South America
RA IV: North America, Central America and the Caribbean
RA V: South-West Pacific
RA VI: Europe
Inter-regional

Future of Global Framework for Climate Services

1

Strengthen WMO Members' climate service capacity and capability

- Collect and analyse data on capacity and needs (including from NAPs)
- Establish National Frameworks for Climate Services, and National Climate Fora



2

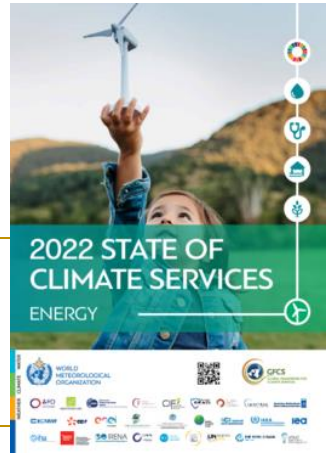
Support climate policy and finance

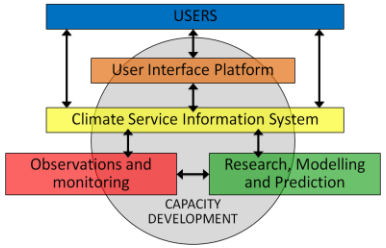
- Flagship reports (Global and Regional State of Climate; State of Climate Services) for and with stakeholders, as requested under Paris Agreement. Feed into monitoring and review of GFCS
- Tools to assist countries to incorporate climate science into actions and investments

3

Develop the value chain/cycle of climate services

- Observations, research, modelling; climate services information system; user engagement
- Generate value and enable actions





4

Develop Standards and Quality Management

- Climate Services capacities (basic, essential, full, advanced)
- WMO guidance (standards and competencies), through WMO's SERCOM and INFCOM

GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

5

Improve visibility and effectiveness of GFCS, promote coordination

- Climate services hugely important to society. Global-regional-national coordination essential
- Provide a forum for stakeholders for communication, knowledge sharing, collaboration
- Revitalize the GFCS website

Early Warnings for All
Structure and Objectives

Pillar 1
Disaster risk knowledge

Systematically collect data and undertake risk assessments

- Are the hazards and the vulnerabilities well known by the communities?
- What are the patterns and trends in these factors?
- Are risk maps and data widely available?

Pillar 2
Detection, observations, monitoring, analysis and forecasting of hazards

Develop hazard monitoring and early warning services

- Are the right parameters being monitored?
- Is there a sound scientific basis for making forecasts?
- Can accurate and timely warnings be generated?

Pillar 4
Preparedness and response capabilities

Build national and community response capabilities

- Are response plans up to date and tested?
- Are local capacities and knowledge made use of?
- Are people preapred and ready to react to warnings?

Pillar 3
Warning dissemination and communication

Communicate risk information and early warnings

- Do warnings reach all of those at risk?
- Are the risks and warnings understood?
- Is the warning information clear and usable?

Thank you

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