

# Towards operationalization of objective seasonal forecasts and tailored products on sub-regional scales



**WMO OMM**

**World Meteorological Organization  
Organisation météorologique mondiale**

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# Context: WMO strategic plan 2020-2030

## VISION 2030

By 2030, a world where **all nations**, especially the **most vulnerable**, are **more resilient** to the **socioeconomic impact of extreme weather, climate, water and other environmental events**, and **empowered** to boost their **sustainable development** through the **best possible services**, whether over land, at sea or in the air



## OVERARCHING PRIORITIES

Enhancing preparedness for, and reducing losses of life and property from hydrometeorological extremes

Supporting climate-smart decision-making to build resilience and adaptation to climate risk

Enhancing socioeconomic value of weather, climate, hydrological and related environmental services



## CORE VALUES

Accountability for Results and Transparency

Collaboration and Partnership

Inclusiveness and Diversity



## LONG-TERM GOALS

**Better serve societal needs**  
Delivering authoritative, accessible, user-oriented and fit-for-purpose information and services

**Enhance Earth system observations and predictions**  
Strengthening the technical foundation for the future

**Advance targeted research**  
Leveraging leadership in science to improve understanding of the Earth system for enhanced services

**Close the capacity gap**  
Enhancing service delivery capacity of developing countries to ensure availability of essential information and services

**Strategic realignment of WMO structure and programmes**  
Effective policy- and decision-making and implementation

## STRATEGIC OBJECTIVES 2020-2030 FOCUS

- Strengthen national multi-hazard early warning/alert systems and extend reach to better enable effective response to the associated risks
- Broaden the provision of policy- and decision-supporting climate information and services
- Further develop services in support of sustainable water management
- Enhance the value and innovate the provision of decision-supporting weather information and services

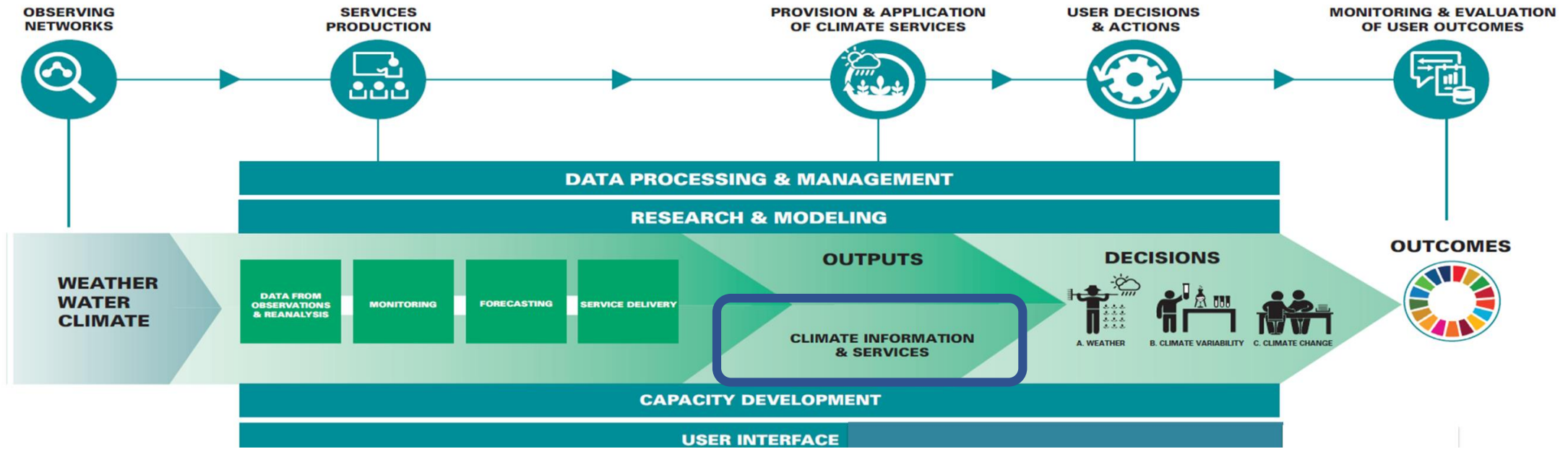
- Optimize the acquisition of observation data through the WMO Integrated Global Observing System
- Improve and increase access to, exchange and management of current and past Earth system observation data and derived products through the WMO Information System
- Enable access and use of numerical analysis and prediction products at all temporal and spatial scales from the WMO seamless Global Data Processing and Forecast System

- Advance scientific knowledge of the Earth system
- Enhance the science-for-service value chain ensuring scientific and technological advances improve predictive capabilities
- Advance policy-relevant science

- Address the needs of developing countries to enable them to provide and utilize essential weather, climate, hydrological and related environmental services
- Develop and sustain core competencies and expertise
- Scale-up effective partnerships for investment in sustainable and cost-efficient infrastructure and service delivery

- Optimize WMO constituent body structure for more effective decision-making
- Streamline WMO programmes
- Advance equal, effective and inclusive participation in governance, scientific cooperation and decision-making

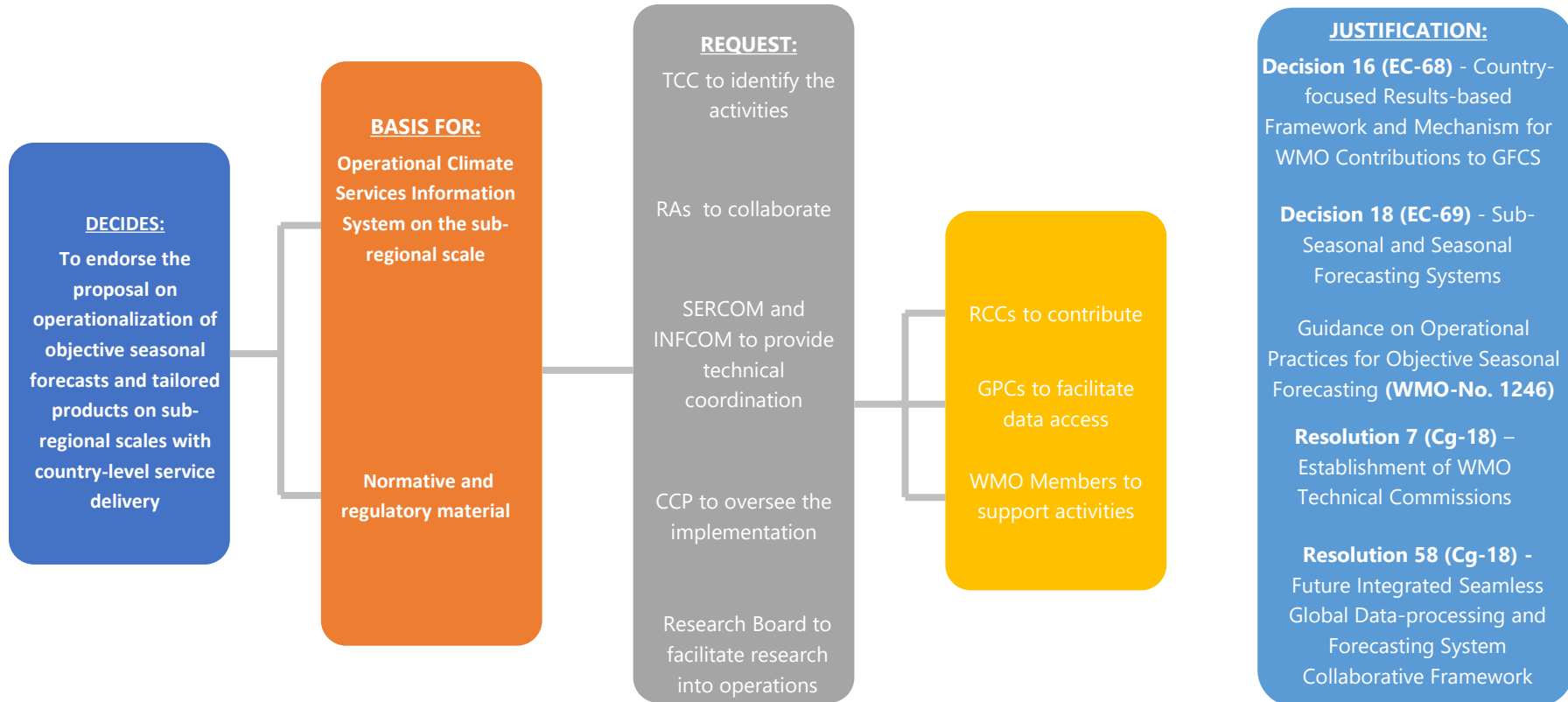
# Climate services delivery at country level



## Investments in the regional component of climate services information system (CSIS-R)

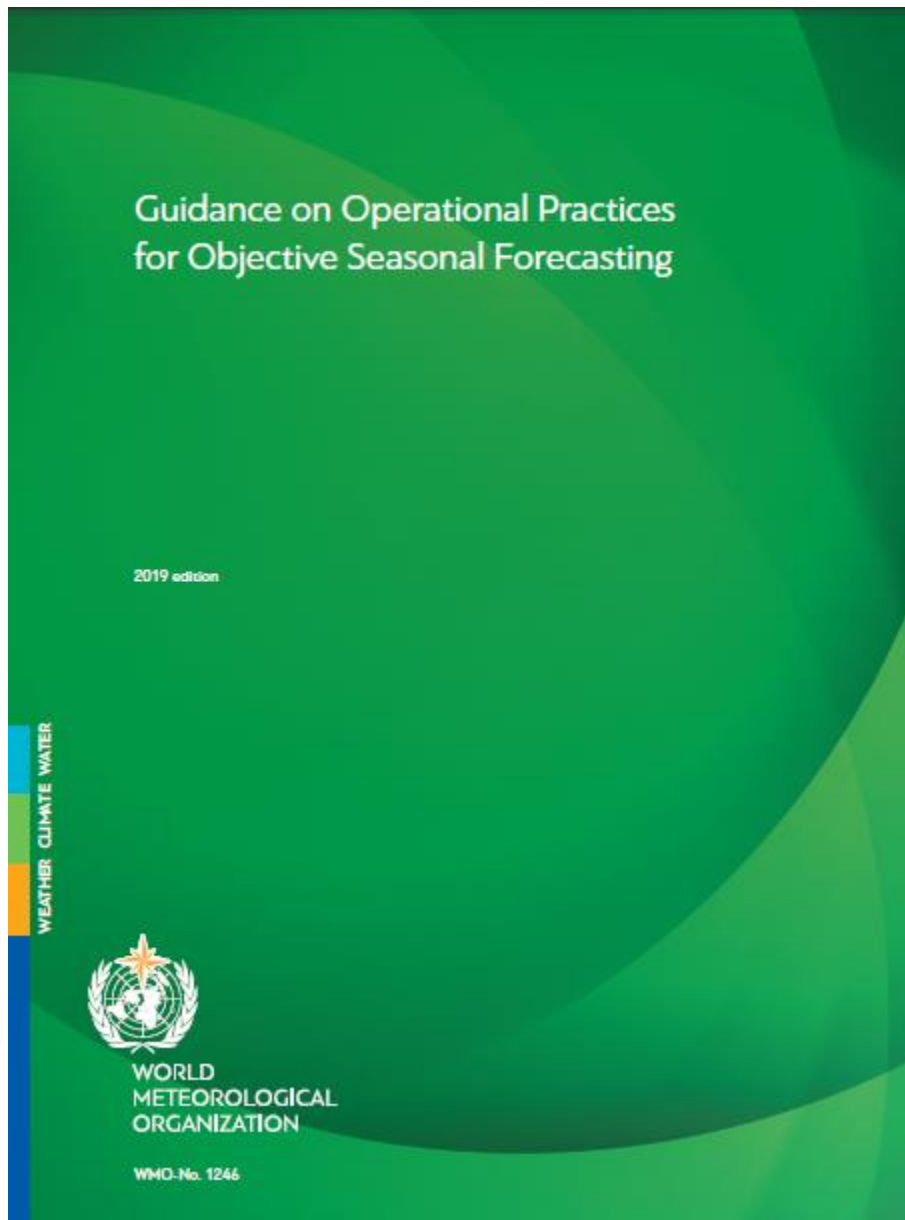
Operational and institutional mechanisms to collate, process, exchange and disseminate information about past, present and future climate nationally, regionally and globally

# 2020 WMO Executive Council EC72 - Decision 4.1(2)/1





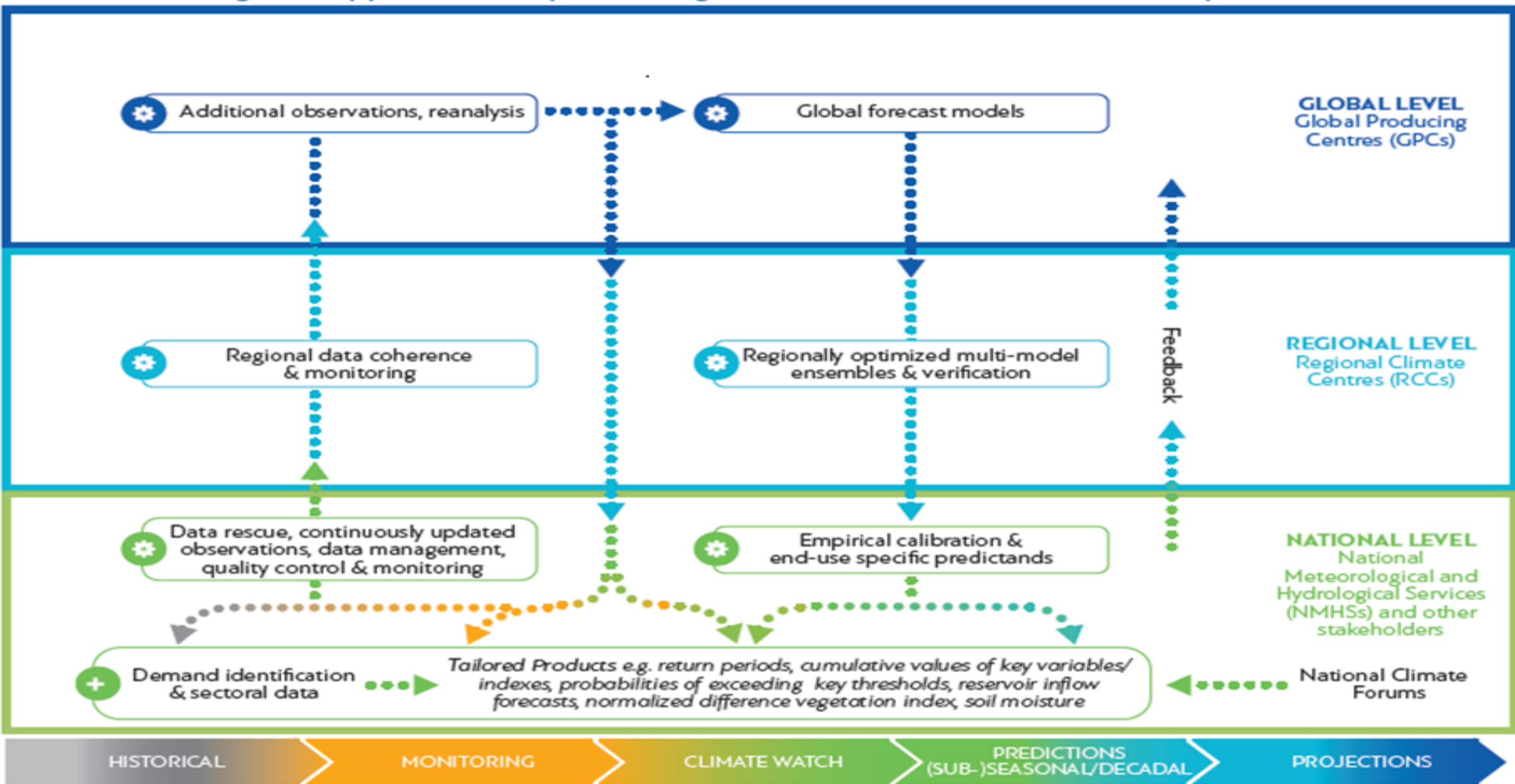
# Principles for objective seasonal prediction



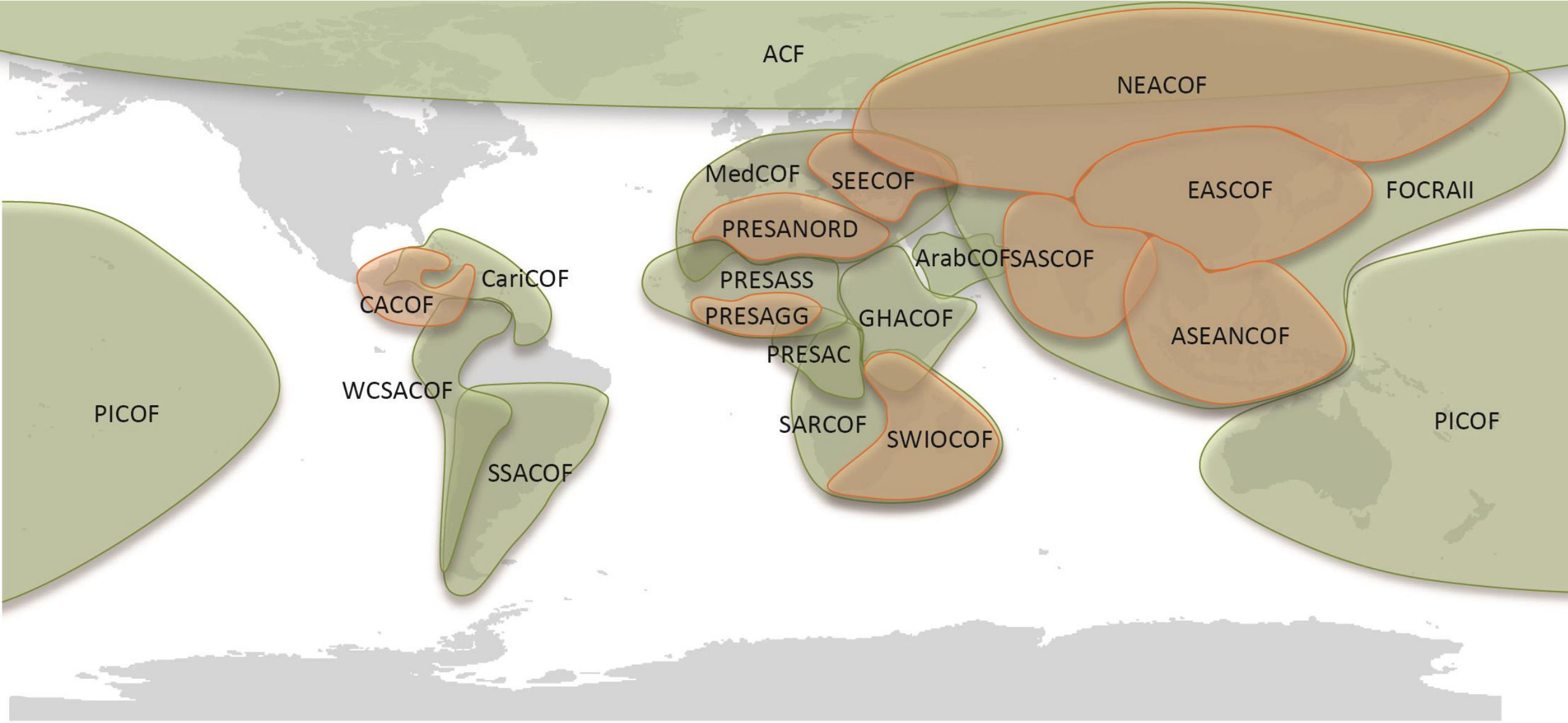
- Follow a **traceable, reproducible**, and well-documented procedure, amenable to verification.
- Use dynamical climate models, including **multi-model ensembles**
- Establish quality controlled **observational databases** for forecast verification
- Identify, assess and monitor **drivers of predictable climate variability**
- Follow forecast **verification standards**
- Provide forecast information together with historical performance
- Use non-technical language to **communicate uncertainty**
- Provide seasonal forecasts as well as **regular updates** on a fixed operational schedule
- Establish **user feedback** and product upgrade mechanisms

# A Regional Approach to Implementing the Climate Services Information System (CSIS-R)

Regional Climate Forums



# RCOF - Platform for operationalizing objective seasonal forecasts





# Limitations of current practices at RCOF

## 1. Use of consensus/subjective based forecast with drawbacks

- a. Traceability and reproducibility
- b. Usability and digital format
- c. Mechanical blending process
- d. Advances in sub-seasonal and seasonal forecasting

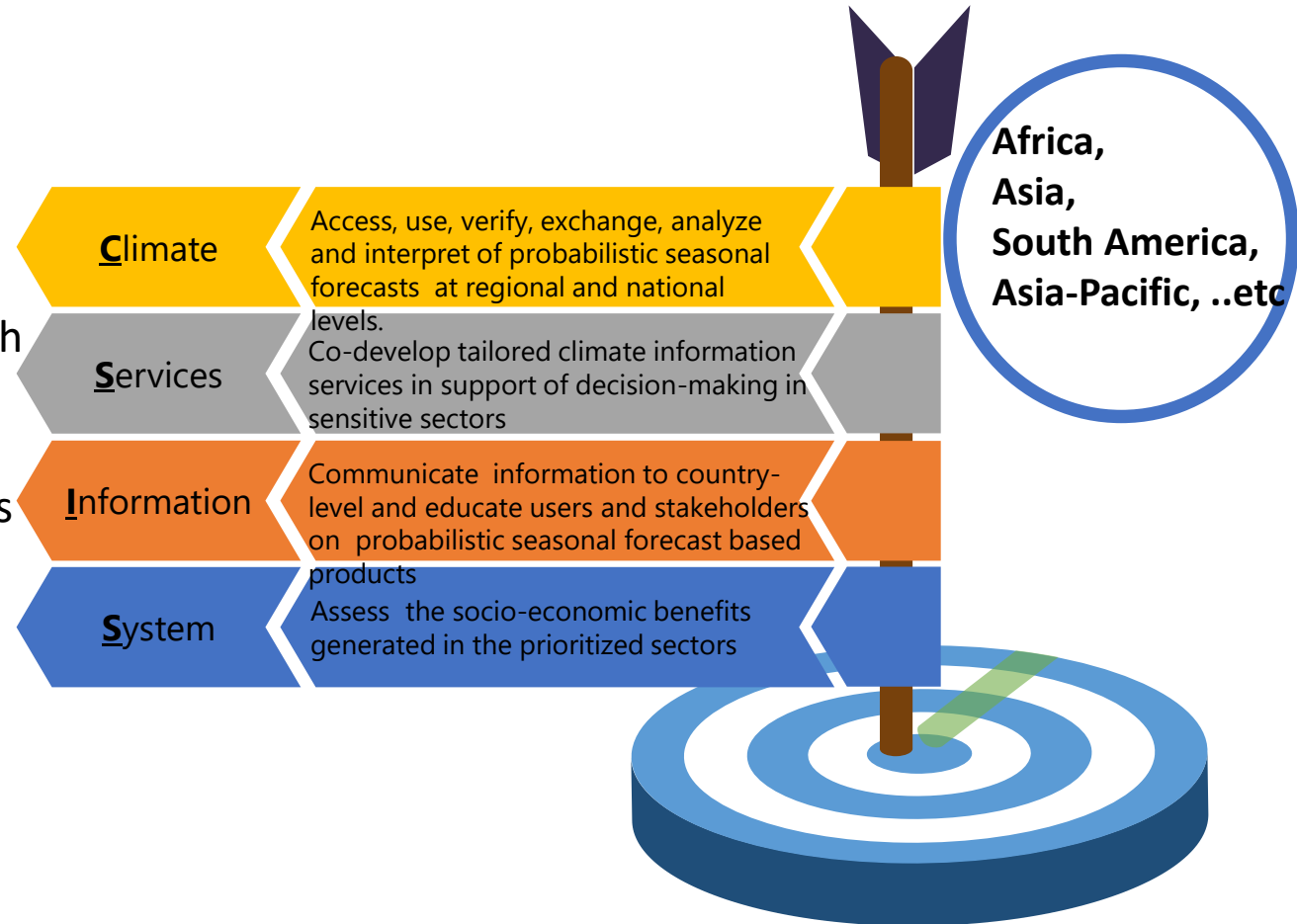
## 2. EC-69 Decision 4.5/2 decided to:

- “consider the adoption of objective sub-seasonal and seasonal forecasts as an overarching technical strategy, particularly at regional and national levels, promoted through RCOFs ...”
- CCI+CBS to develop technical guidance
- CCI to support development of best practices for RCOFs

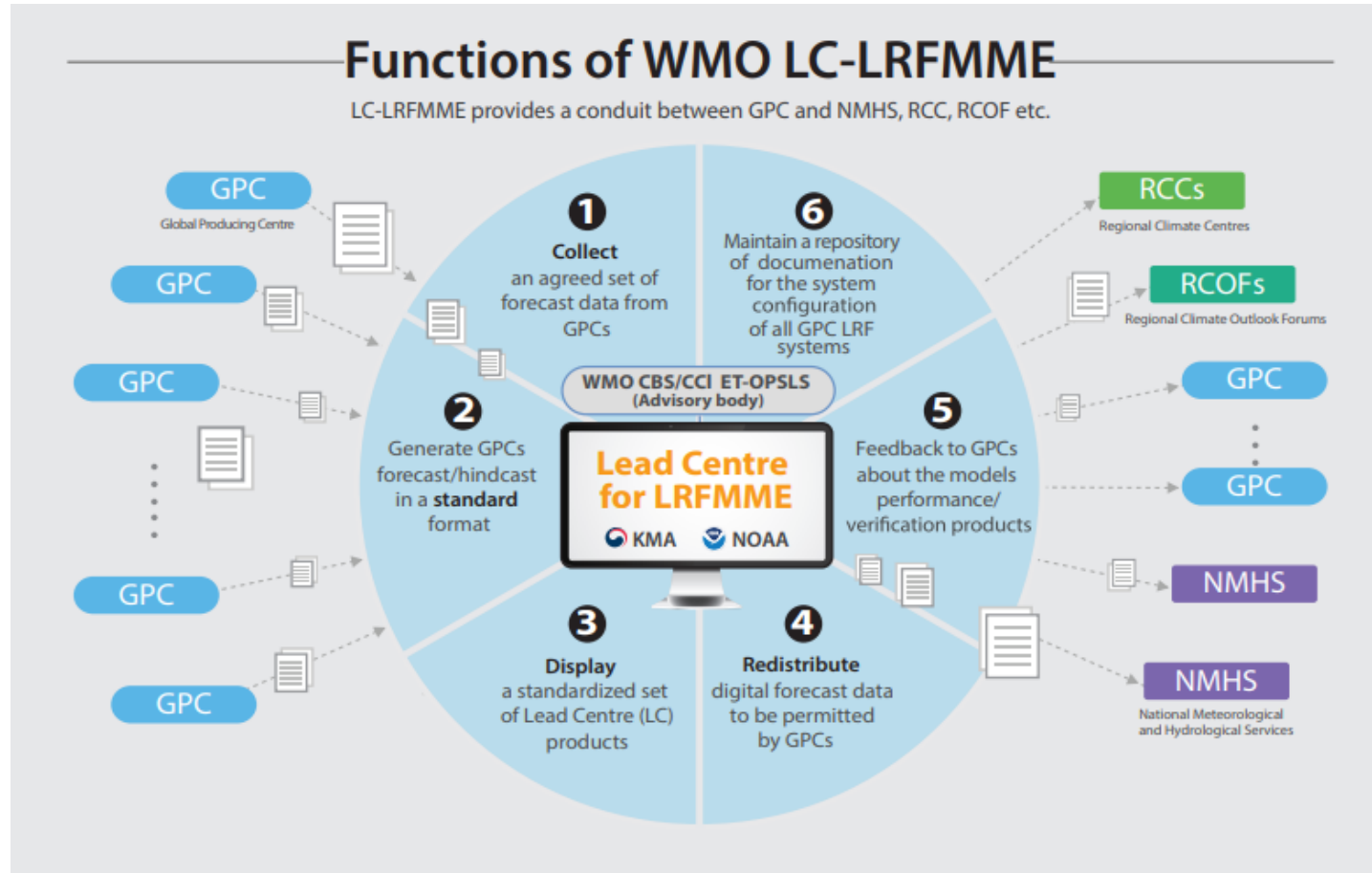
## 3. 2017 Global review of RCOFs

# Project goal and objectives

Enhance the country-level capacity to deliver tailored products and services through the operationalization of the Climate Services Information System on sub-regional scales (CSIS-R)









# WMO global infrastructure for Long Range Forecasts



# WMO Regional climate centres



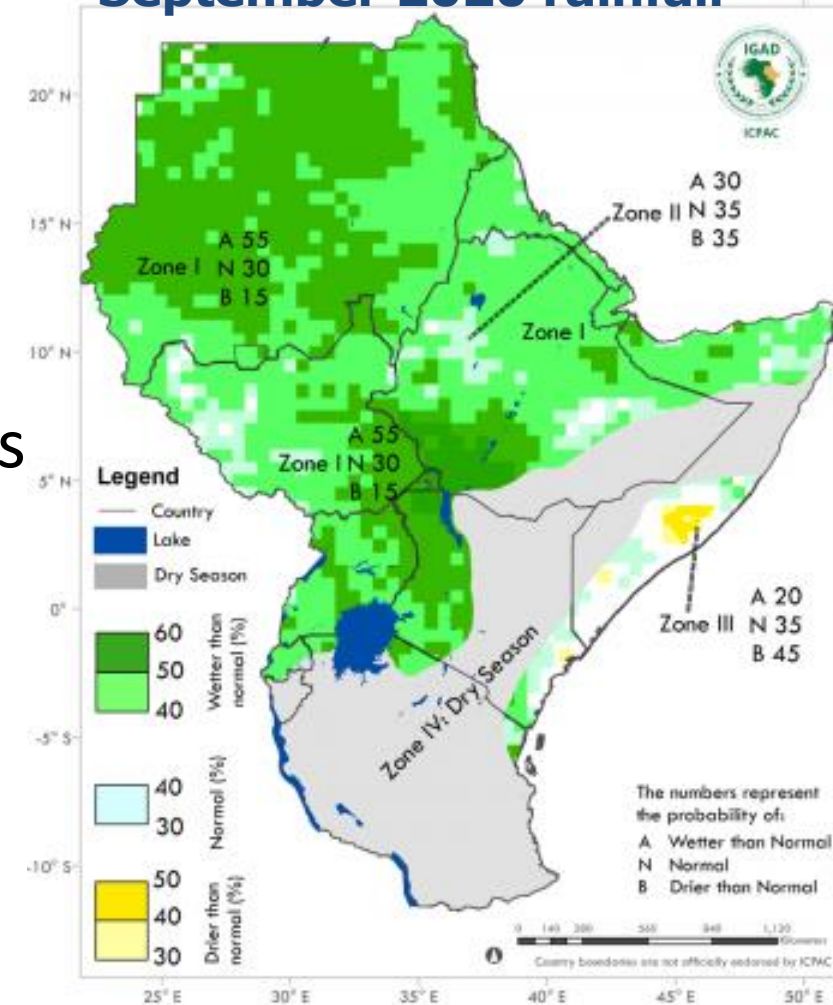
## Legend

-  designated RCC
-  RCC in demonstration phase
-  RCC proposed
-  designated RCC-Network
-  RCC-Network in demonstration phase
-  RCC-Network proposed

# Lessons from standard operating procedures

1. Survey based on the 2019 guidance on «operational practice for objective seasonal forecasting»
2. SASCOF and GHACOF responded to 36 questions
  - a) Data need for calibration + understanding of regional climate variability
  - b) Framework and tools to support seasonal outlook
  - c) Stages for developing seasonal outlook

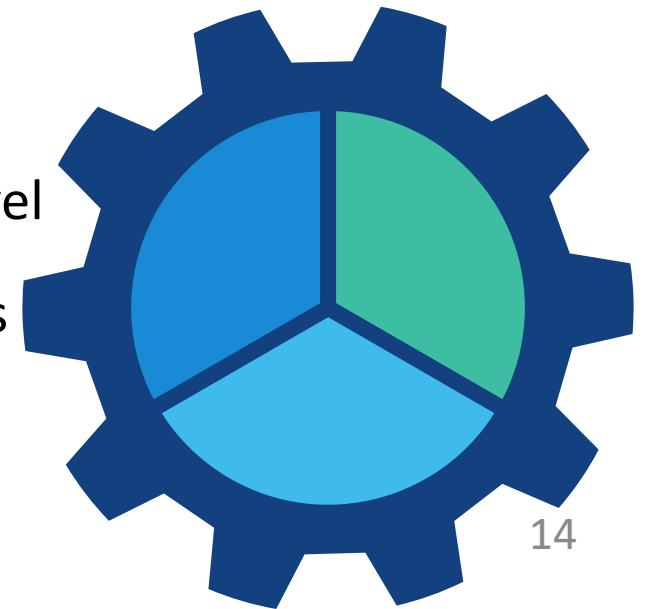
## GHACOF: June to September 2020 rainfall





# Project design and work packages

- **WP1:** Regional standard observational and quasi-observational databases established for routine climate model calibration, verification and climate monitoring
- **WP2:** Enhanced RCCs and NMHSs capacity on objective LRF (Long Range Forecasting)
- **WP3:** Subset of models established for use in ensemble seasonal predictions at regional and national levels
- **WP4:** Calibration and downscaling approaches identified for use in regional seasonal predictions
- **WP5:** Regional climate outlook statement standardized
- **WP6:** High priority tailored products routinely delivered at country level
- **WP7:** Climate outlook updated monthly at regional and national levels
- **WP8:** Verification and upgrading mechanism established



# Work package 1: Observational databases for verification and monitoring

Outputs		technical units	partners
<b>Outcome 1: Regional standard observational and quasi-observational databases established for routine climate model calibration, verification and climate monitoring</b>			
<b>Historical data and products derived from current and past observations rescued and digitized</b> , and discoverable and accessible and exchangeable through WIS	<ul style="list-style-type: none"> <li>• Standing Committee Information Management and Technology;</li> <li>• Standing Committee for Climate Services;</li> <li>• Regional Associations;</li> <li>• Standing Committee on Earth Observing Systems and Monitoring Networks;</li> </ul>	SERVICES/CMP/RCP, INFRASTRUCTURE/WIS, SCIENCE&INNOVATION, MEMBER SERVICES	COPERNICUS, NOAA-NCEI, ECMWF, ACRE, METEO FRANCE, UK MET OFFICE, CRU, KNMI, BOM, IEDRO,
<b>All observations taken at national level incorporated</b> into national and regional datasets, and incorporated in a climate data management system (CDMS)	Standing Committee on Measurements, Traceability and Instrumentation	SERVICES/CMP, SERVICES/RCP, INFRASTRUCTURE, MEMBER SERVICES & DEVELOPMENT DEPARTMENT	COPERNICUS, ECMWF, NOAA-NCEI, ACRE, METEO FRANCE, MET OFFICE, BOM, IEDRO
<b>Customized regional reference observational databases implemented:</b> RCCs and NMHSs staff members trained to use, access, exchange, and quality control standard regional observational datasets (including reanalysis and blended analysis products ) to support the delivery of objective seasonal forecast at regional and national levels	Standing Committee for Climate Services; Standing Committee Information Management and Technology; Research Board, JCB	SERVICES/CMP/RCP, INFRASTRUCTURE, SCIENCE&INNOVATION	KNMI, DWD NOAA-NCEI Copernicus University of Rovira i Virgili, Spain University of Reading, UK
<b>Road map for establishing regional reference Databases:</b> assessment of observational datasets used to catalogue regional climate variability and its drivers , including reanalysis and blended analysis products . document shall identify products required and area to be operationalized by RCCs and NMHSs for the provision of	Research Board; Standing Committee for Climate Services; Standing Committee Information Management and Technology; Regional association	SCIENCE&INNOVATION, SERVICES/RCP/CMP, MEMBER SERVICES	WCRP, COPERNICUS, IRI, METEO FRANCE, MET OFFICE, BOM, NOAA

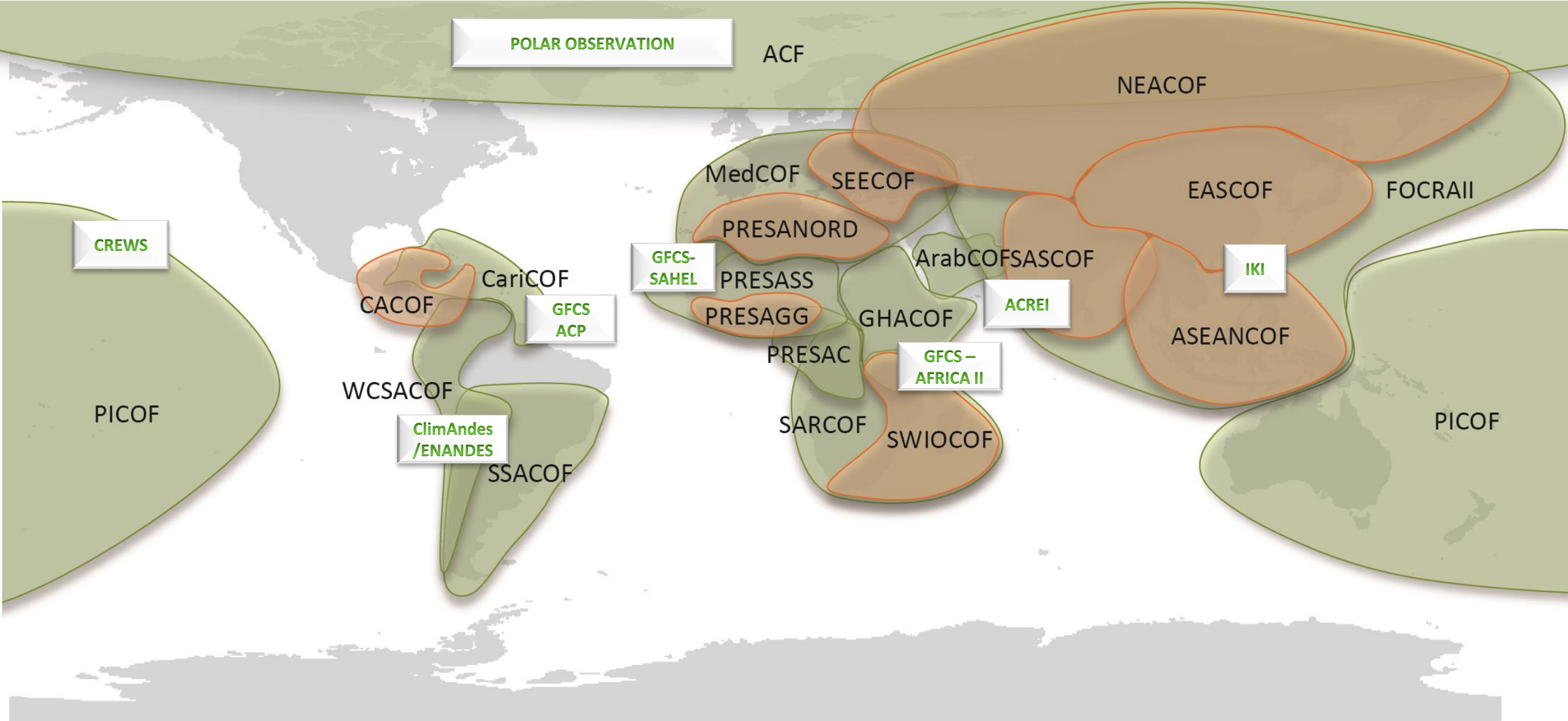
# Work package 2: RCCs and NMHSs capacity needs for timely access, use and interpretation of Long Range Forecasts

WMO to closely collaborate on this component with the WMO Global Producing Centres for Long Range Forecasting (GPCLRFs), WCRP and other partners

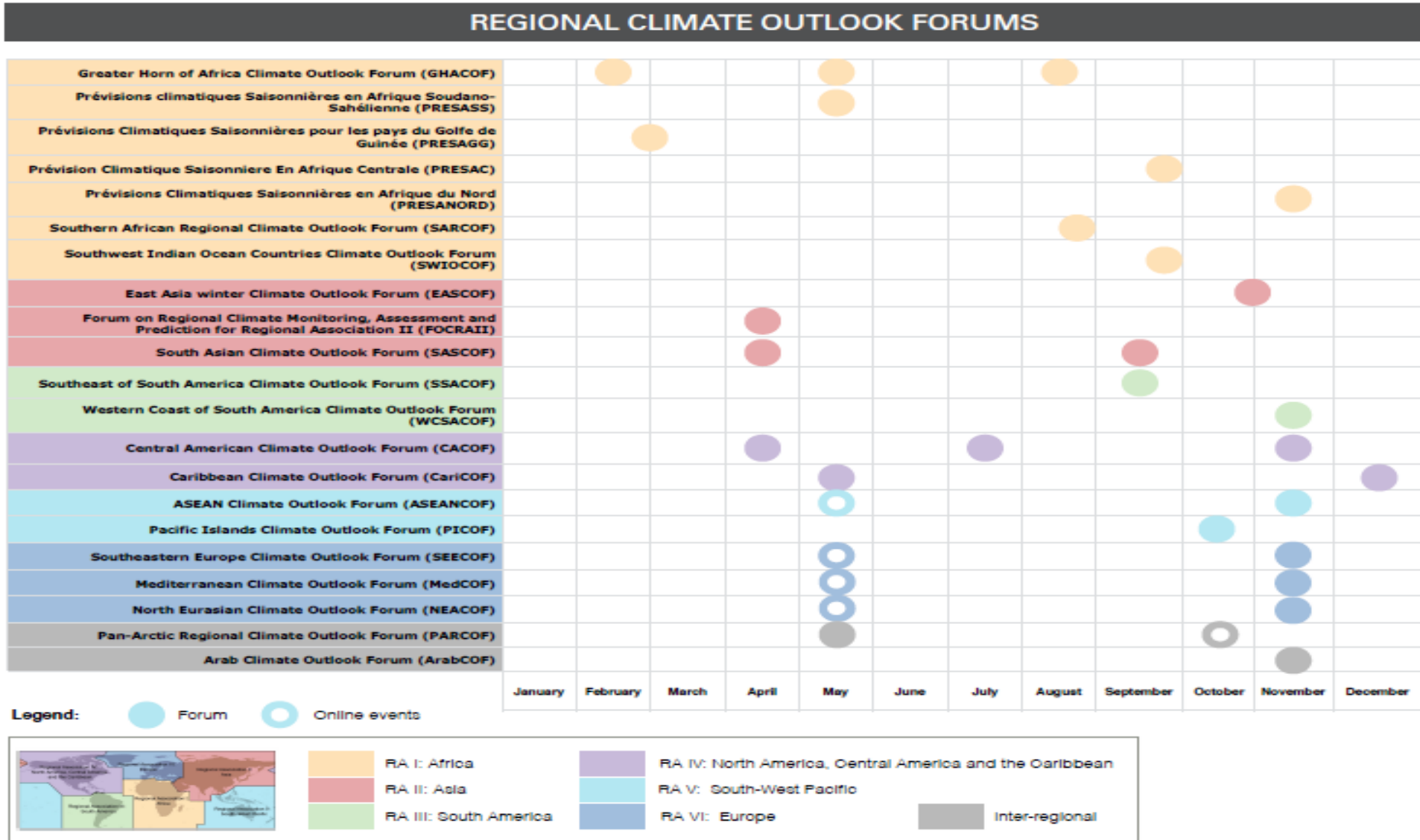
Outcome 2: Enhanced RCCs and NMHSs capacity on objective LRF (Long Range Forecasting)			
Access to Long Range Forecasts: NMHSs staff trained to access and use LRF from WMO lead centre (LC-LRFMME) and other dynamical LRF products, including those products from RCCs	Standing Committee on Data Processing for Applied Earth System Modelling and Prediction; Research Board;	INFRASTRUCTURE S/RCP, SCIENCES&INNOVATION, MEMBER SERVICES & DEVELOPMENT DEPARTMENT	WCRP, MET OFFICE, NOAA, METEO FRANCE, IRI
Understanding drivers of climate variability and predictability: NMHSs staff trained on the analysis of regional climate drivers and physical basis of seasonal prediction	Research Board; Standing Committee for Climate Services;	SCIENCES&INNOVATION, SERVICES/RCP/CMP	WCRP, WISER, MET OFFICE, NOAA, METEO FRANCE, IRI, RIMES BOM, Met-Office
Assessment of model performance, reliability, and sources of predictability over the region: RCCs and NMHSs staff trained on selection of best suited models for the region, given the range of forecasts options from multi-models ensemble. This requires support from expert in the analysis of models ability to capture relevant climate processes	Research Board; Standing Committee for Climate Services;	SCIENCES&INNOVATION, SERVICES/RCP	WCRP, MET OFFICE, RIMES, NOAA, METEO FRANCE, IRI
Calibration: RCCs and NMHSs staff trained on selection in all post-processing steps require by the multi-model ensemble (MME) seasonal prediction approach including bias correction and calibration	Research Board; Standing Committee for Climate Services; Standing Committee on Data Processing for Applied Earth System Modelling and Prediction;	SCIENCES&INNOVATION, INFRASTRUCTURE, SERVICES/RCP	WCRP, MET OFFICE, NOAA, METEO FRANCE, IRI
Probabilistic seasonal forecast: RCCs and NMHSs staff trained on interpreting and emphasizing the probabilistic nature of seasonal forecasts		SCIENCES&INNOVATION, INFRASTRUCTURE, S/RCP	WCRP, MET OFFICE, NOAA, METEO FRANCE, IRI, KMA
Real-time forecasts verification: RCCs and NMHSs staff trained on verification of real-time forecasts in addition to establishing the model average predictive skill of the seasonal forecasting system		SCIENCES&INNOVATION, INFRASTRUCTURE, S/RCP	WCRP, MET OFFICE, NOAA, METEO FRANCE, IRI
Downscaling and generation of national products from regionally optimized inputs: RCCs and NMHSs staff trained on better understanding the regional and local climate, and statistical downscaling	Research Board; Standing Committee for Climate Services;	SCIENCES&INNOVATION, S/RCP SERVICES/CMP	WCRP, MET OFFICE, RIMES, METEO FRANCE, IRI



# Initial projects funding



# Timing project support with RCOFs annual calendar







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Thank you