



**World Meteorological Organization**  
Working together in weather, climate and water

# Regional Climate Outlook Forums, Regional Climate Centres and Early Warning Systems

Jaser Rabadi  
WMO Representative for West Asia



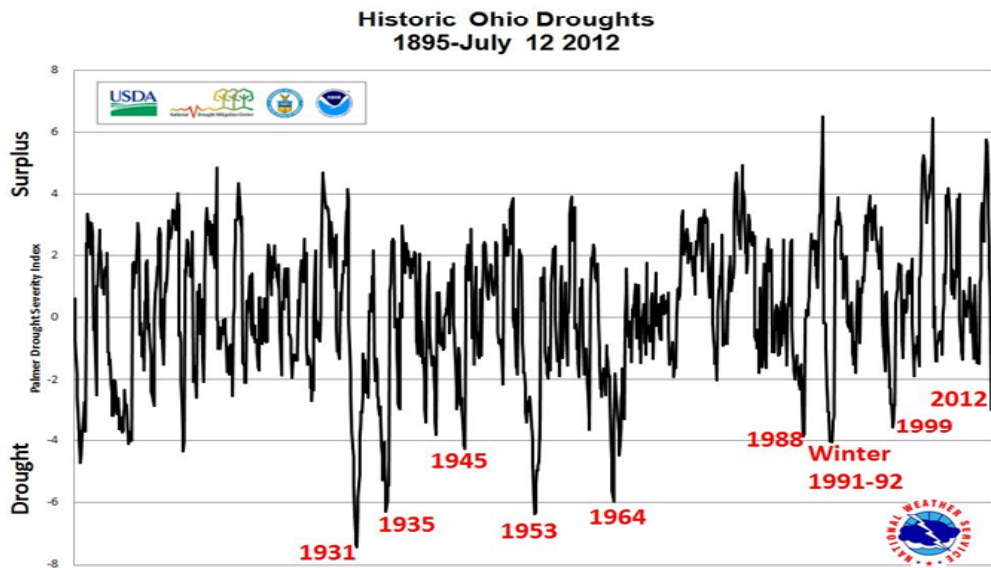
# Climate: Man's Best Frenemy

Atmosphere: natural resource (vital elements)

Yet, poses a variety of challenges: (**extreme weather conditions**)

**90% of disasters: Weather & water-related**

Heat waves, cold spells, storms.....Drought



**Joseph, the son of Jacob...**  
*7 years of plenty followed by 7 years of famine*



## IPCC Report: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)

“There is medium confidence that ***droughts will intensify in the 21st century in some seasons and areas***, due to reduced precipitation and/or increased evapotranspiration. This applies to regions including **southern Europe and the Mediterranean region, central Europe, ...**”

“...project a ***higher likelihood of hydrological drought*** by the end of this century, with a substantial increase in the number of drought days during the last 30 years of the 21st century over North and South America, central and southern Africa, **the Middle East, ...**”

..... WMO Contribution



## WMO World Climate Services Programme (WCSP)

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### Scope of WCSP

Climate data and analysis;

Climate monitoring, watch and **prediction**;

Climate system operation and infrastructure;

Climate adaptation and risk management

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**Global Producing Centers for Long Range Forecasts, GPCs**

**Regional Climate Centers, RCCs**

**Regional Climate Outlook Forums, RCOFs**



# 1. Global Producing Centers, GPCs

**Function:** Provision of information on global-scale long-range (seasonal) prediction to RCCs, RCOFs and NMHSs

<b>Variables:</b>	2m temp, ppn., SST, P,...
<b>Format:</b>	probabilities for tercile categories
<b>Temporal resolution:</b>	1 month or longer (seasons)
<b>Spatial resolution:</b>	2.5°x2.5°
<b>Coverage:</b>	global
<b>Lead time:</b>	0 and 4 months;
<b>Issue frequency:</b>	monthly or at least quarterly
<b>Delivery</b>	graphical images on GPC website and/or digital data for download

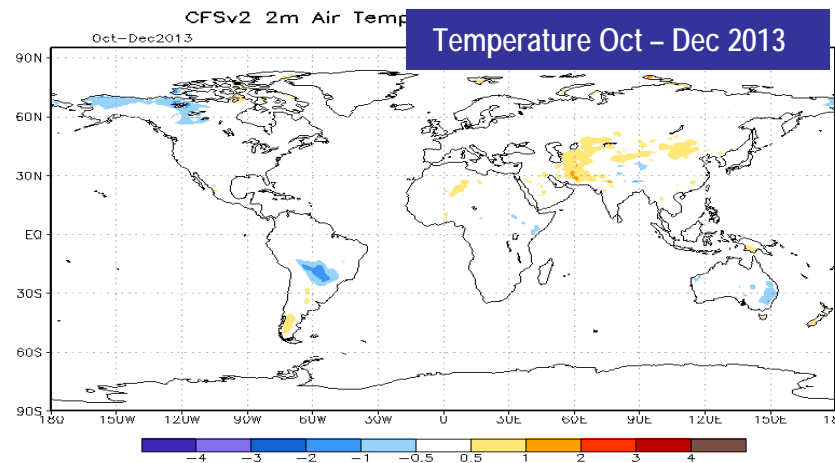
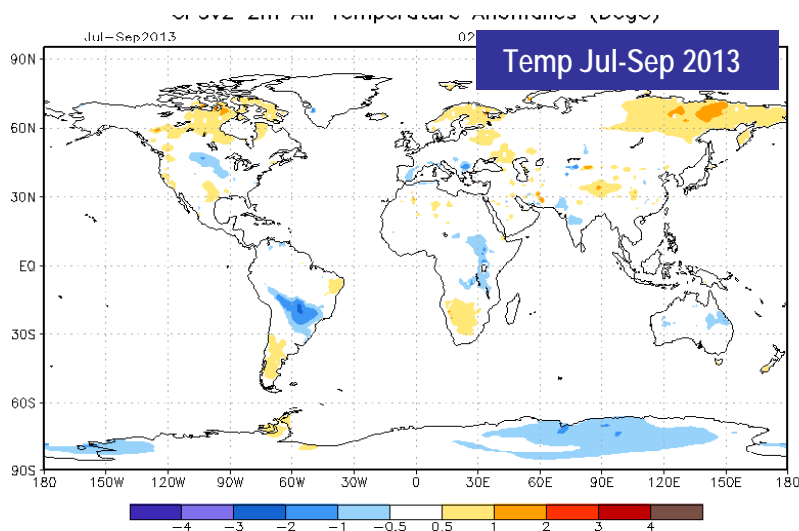
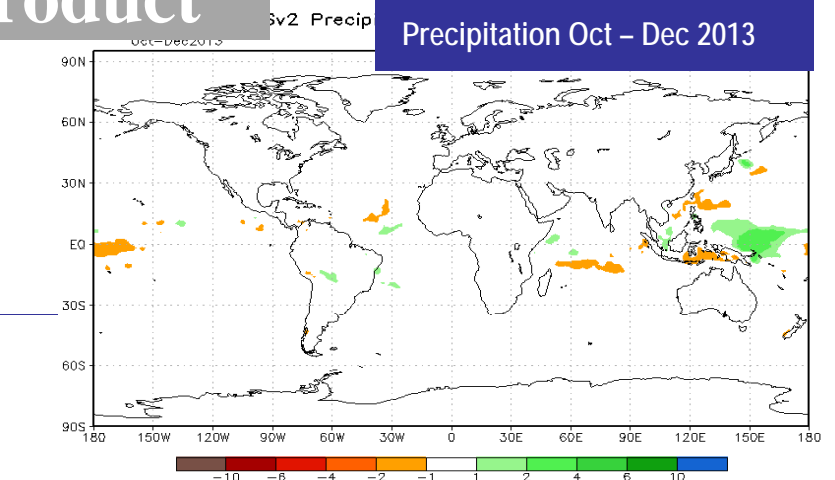
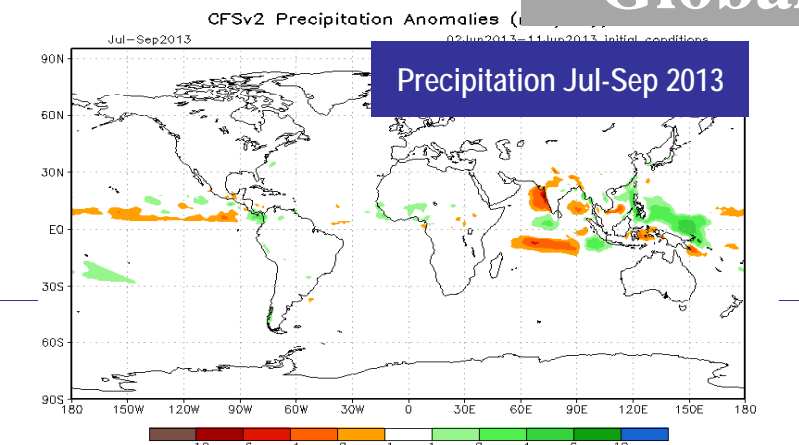


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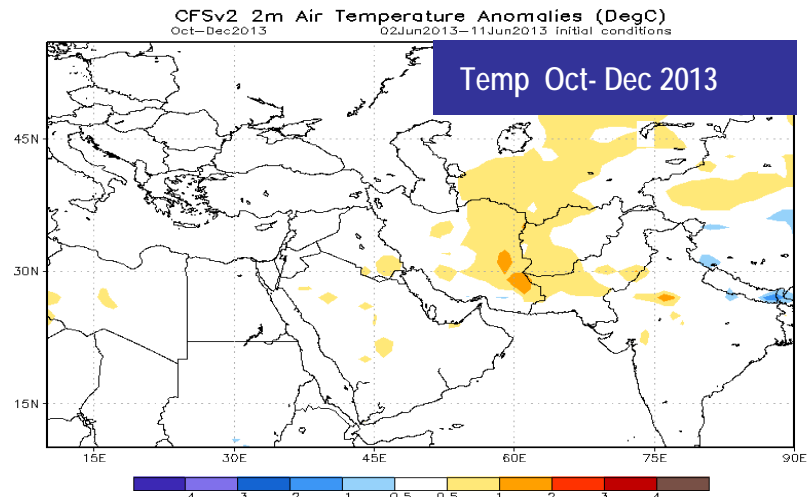
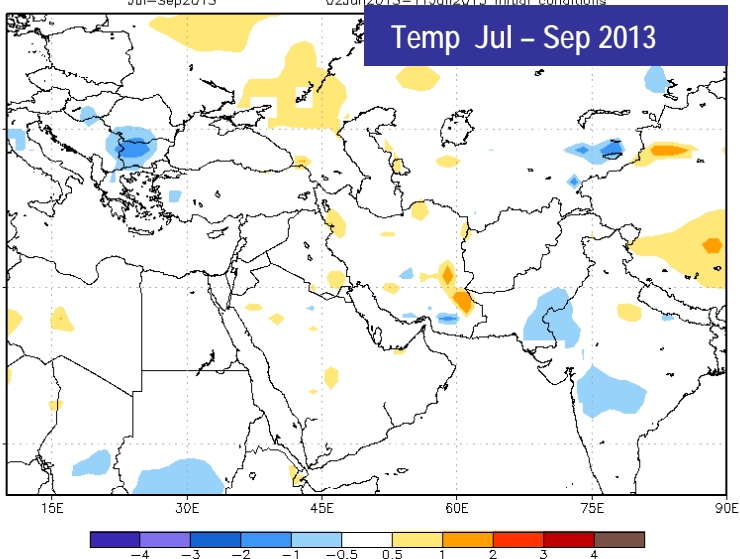
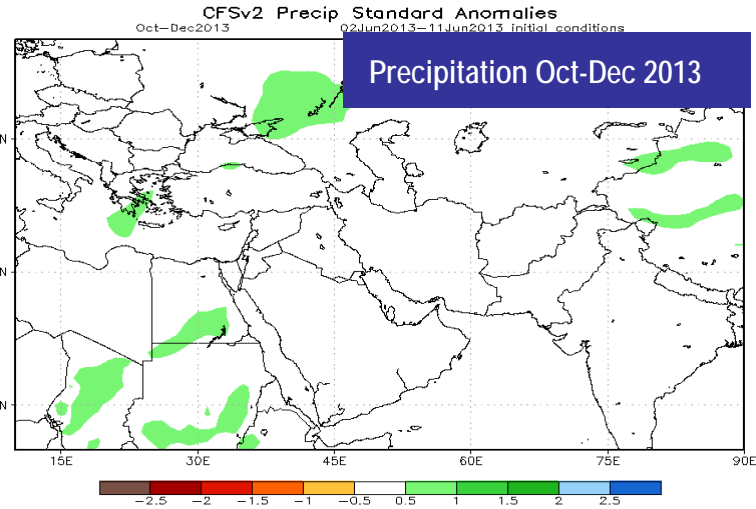
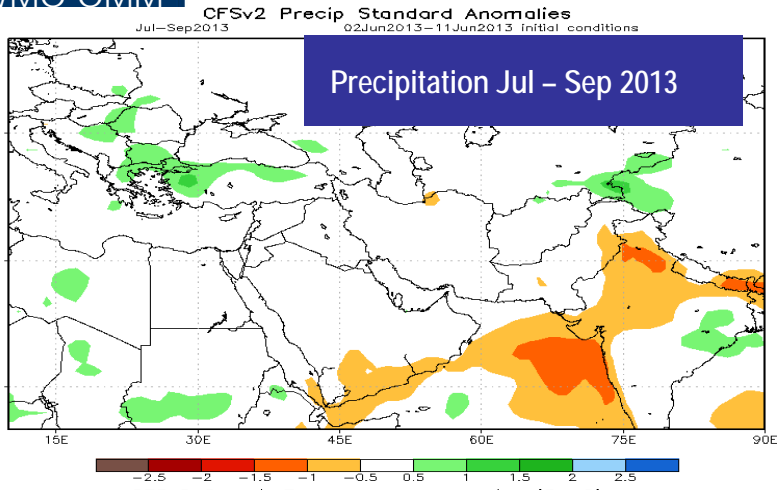
example: **Climate Prediction Center (CPC), NOAA, USA**

# Global Product





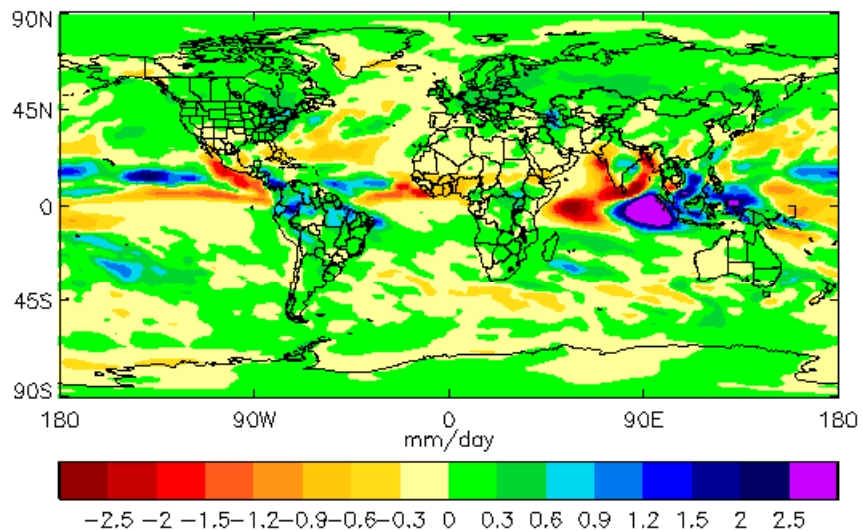
# Regional: Central Asia





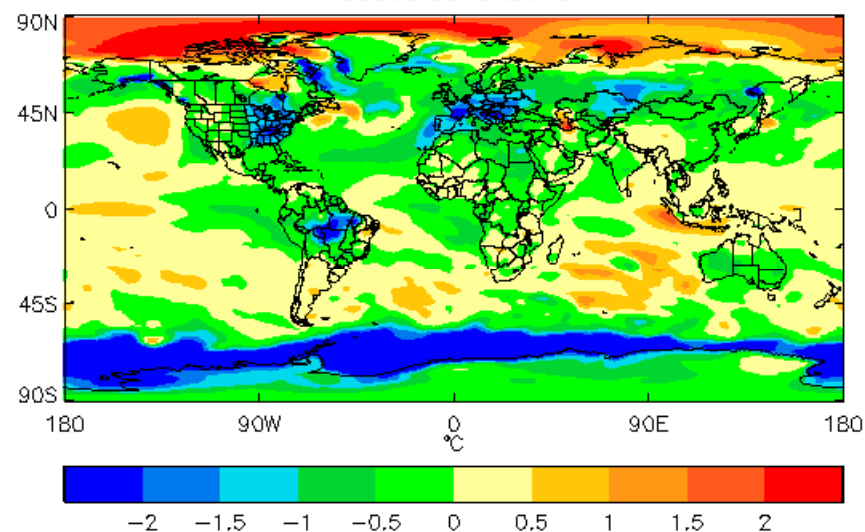
ppn. Jul - Sep 2013

Ensemble mean anomaly : precipitation : Jul/Aug/Sep  
Issued June 2013



Temp Jul - Sep 2013

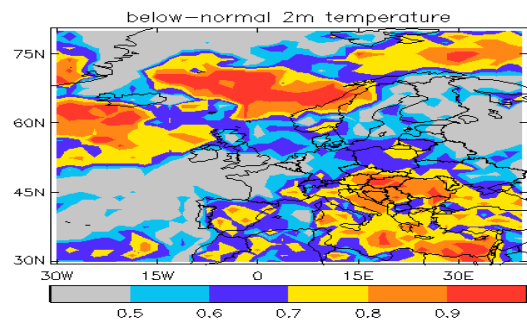
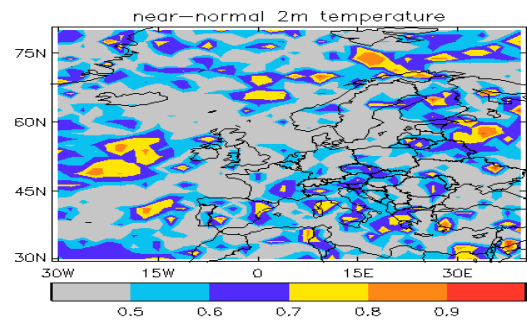
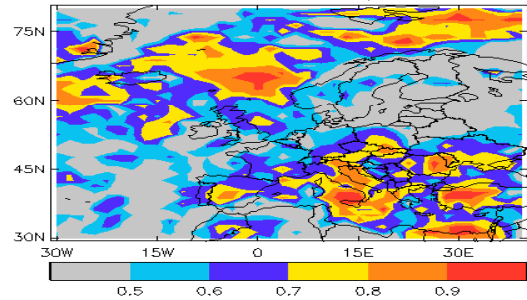
Ensemble mean anomaly : 2m temperature : Jul/Aug/Sep  
Issued June 2013



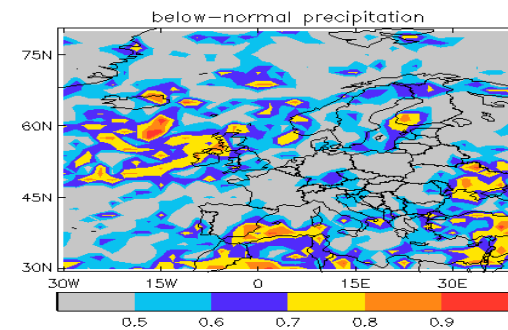
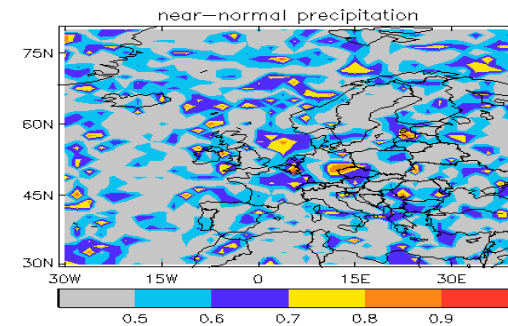
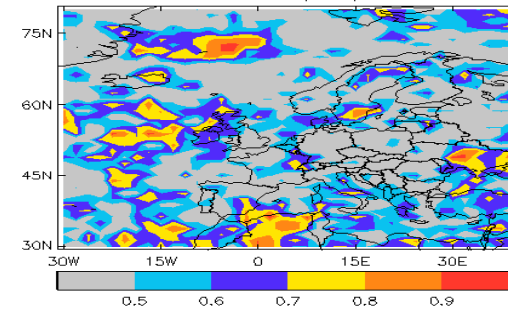


# JMA temp. & PPn.

ROC scores for tercile categories Jun/Jul/Aug/: Issued May  
above-normal 2m temperature



ROC scores for tercile categories Aug/Sep/Oct/: Issued May  
above-normal precipitation





## 2. Regional Climate Centres, RCCs

- RCCs are Centres of Excellence, which perform mandatory operational regional-scale climate functions in the domains of ***long-range forecasting, climate monitoring, data services and training***
- Designation: Regional consensus
- Implementation process: ....(annex)
- Users: NMHSs in Region+

### Functions

Interpret and assess LRF products from GPCs, including the exchange of basic forecasts and hindcast data

- Generate regional tailored products, including **consensus-based seasonal** climate outlooks
  - Provide online access to RCC products
  - Perform regional climate diagnostics
  - Develop regional climate datasets
  - Establish a regional historical reference climatology
  - Provide climate archiving services.
- ..... (annex)



# RCC Network

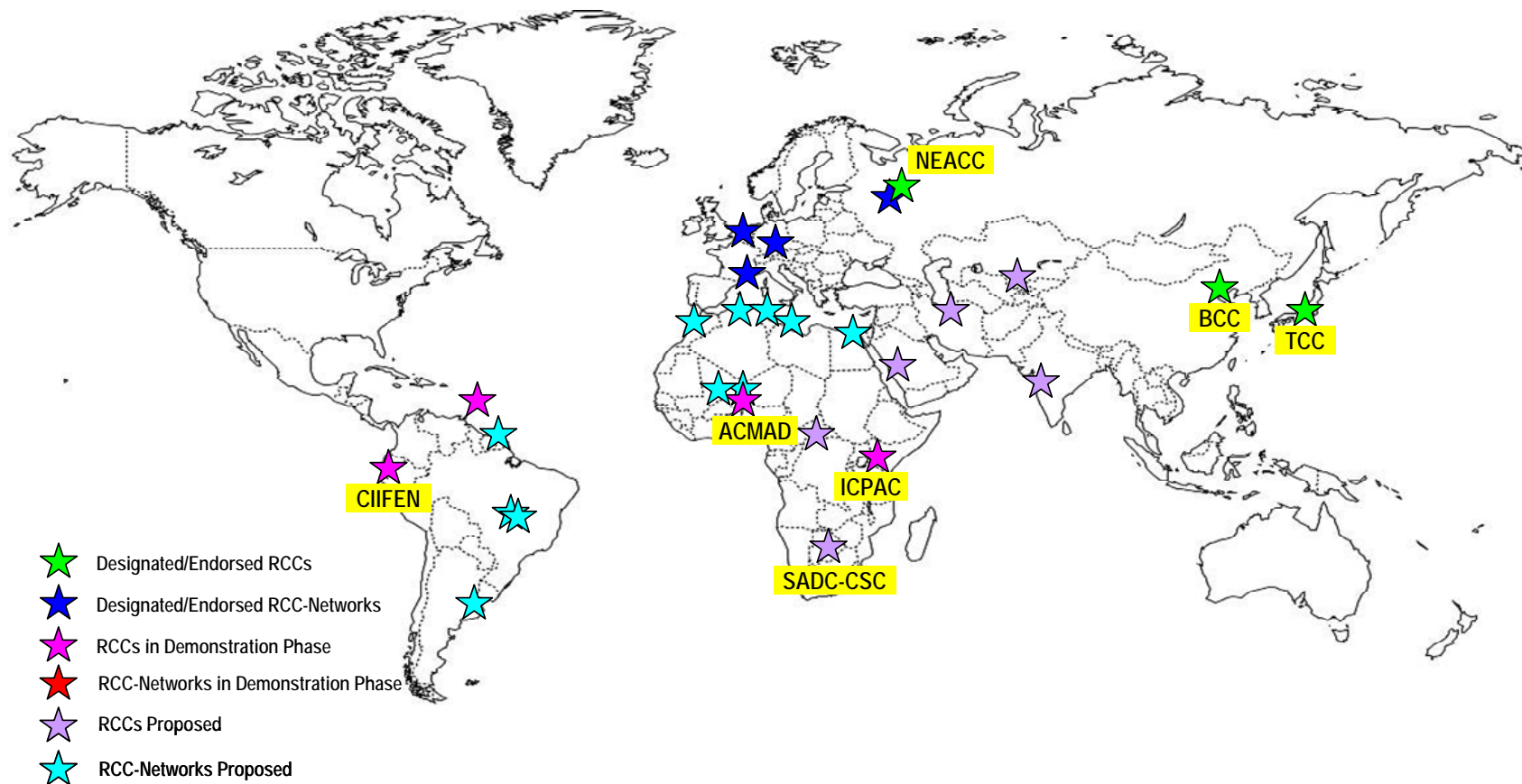
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**Regional Climate Centre Network:** A group of centres performing climate-related activities that collectively fulfil all the required functions of an RCC;

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Each centre in WMO RCC Network will be referred to as a **Node**;  
A Node will perform, only performs **one or several** of the mandatory RCC activities: long-range forecasting, climate monitoring, climate data services, and training.

# WMO Regional Climate Centres





## some RCCs .....

### **African-RCC:**

African Center of Meteorological Applications for Development (ACMAD)

<http://www.acmad.ne/en/homepage.htm> Location: Niamey, Niger

### **IGAD-RCC:**

IGAD Climate Prediction and Applications Centre (ICPAC)

<http://www.icpac.net/>

Location: Nairobi, Kenya

### **Proposed: Morocco**

The North African countries Algeria, Egypt, Libya, Morocco and Tunisia elaborated a project proposal for the **North African RCC-Network**, .....

### **Europe WMO RA VI RCC-Network**

[http://www.wmo.int/pages/prog/dra/eur/RAVI\\_RCC\\_Network.php](http://www.wmo.int/pages/prog/dra/eur/RAVI_RCC_Network.php)

<http://www.rccra6.org/>

Domain: All countries of RA VI

*Awaiting designation as a WMO RCC-Network*

### **Southeast Europe Climate Outlook Forum (SEECOF)**

### **Asia**

#### **RCC Beijing**

Beijing Climate Center (BCC)

<http://bcc.cma.gov.cn/en/>

Location: Beijing, China

#### **RCC Tokyo**

Tokyo Climate Center (TCC)

<http://ds.data.jma.go.jp/tcc/tcc/index.html>

Location: Tokyo, Japan

Domain of interest: All Asia and Western Pacific (40N-20S, 30E-180)

#### **North EurAsia Climate Centre (NEACC)**

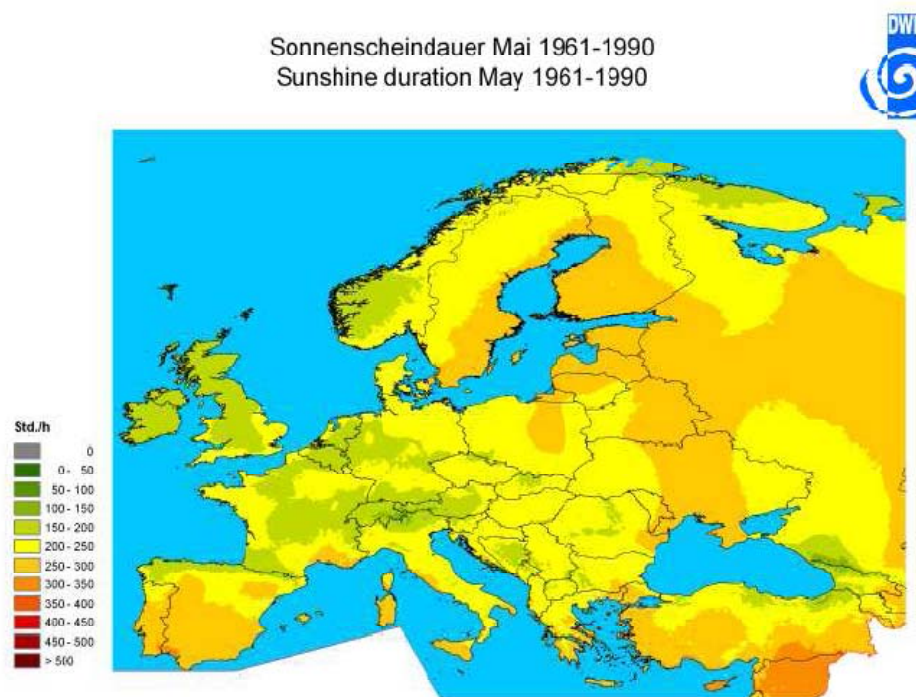
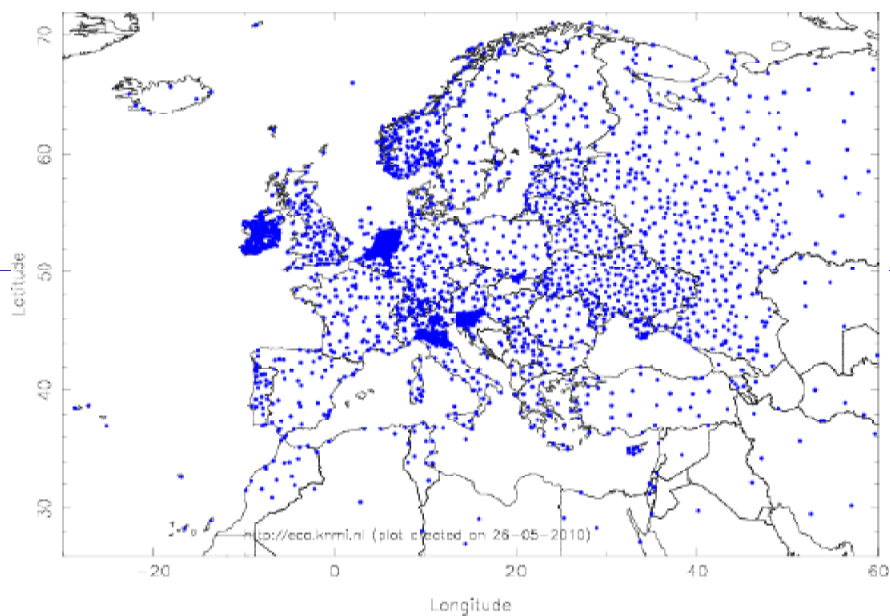
<http://neacc.meteoinfo.ru> (English)

<http://seakc.meteoinfo.ru> (Russian)

Location: Moscow, Russian Federation

Domain: CIS countries including the Russia

**Proposed: Iran, Saudi Arabia....**

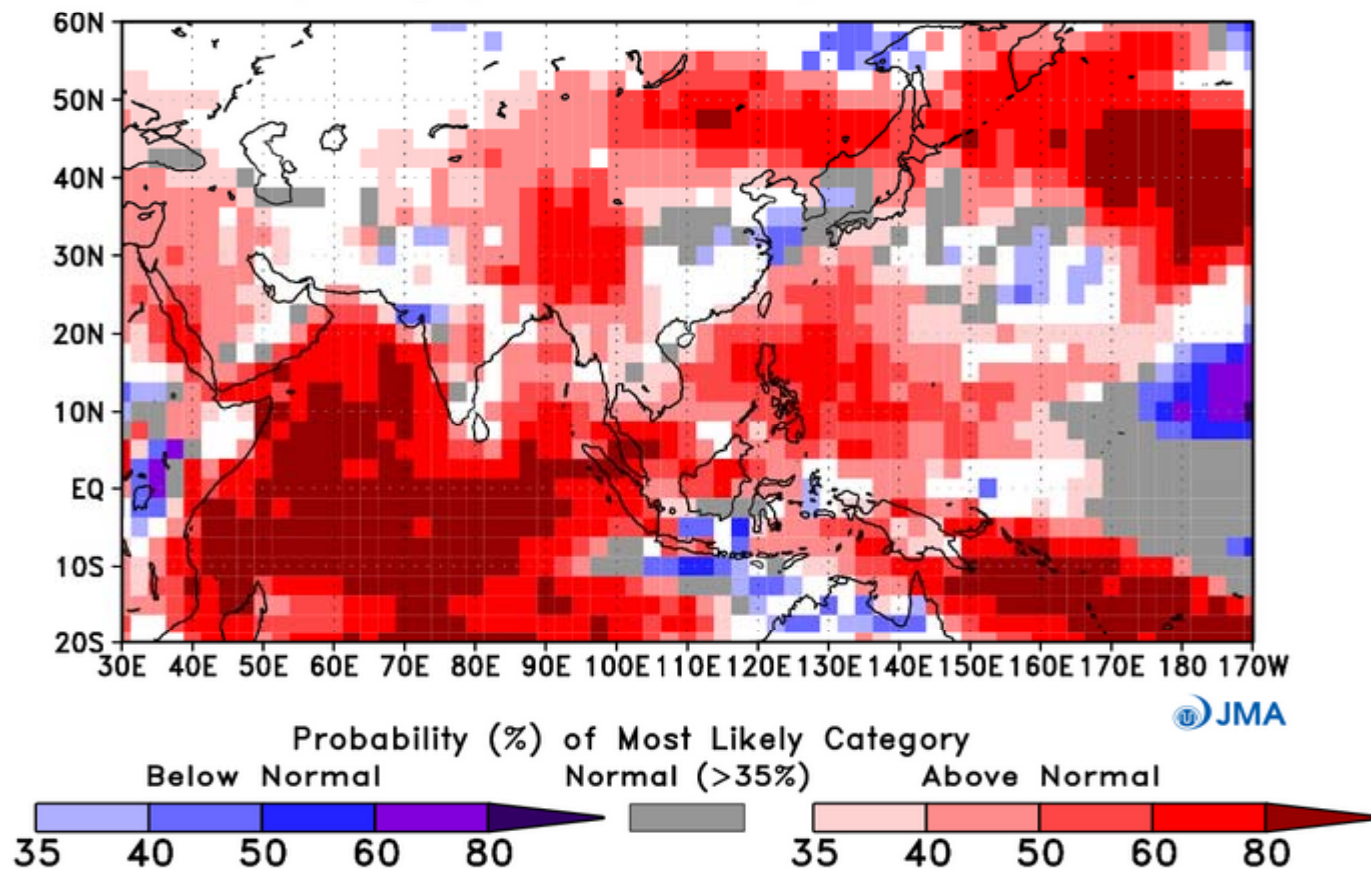


Station density of regional climate dataset (left) and **reference climatology** (May, 1961-90) for sunshine duration (right)



e.g. **RCC Tokyo: Seasonal forecast product**

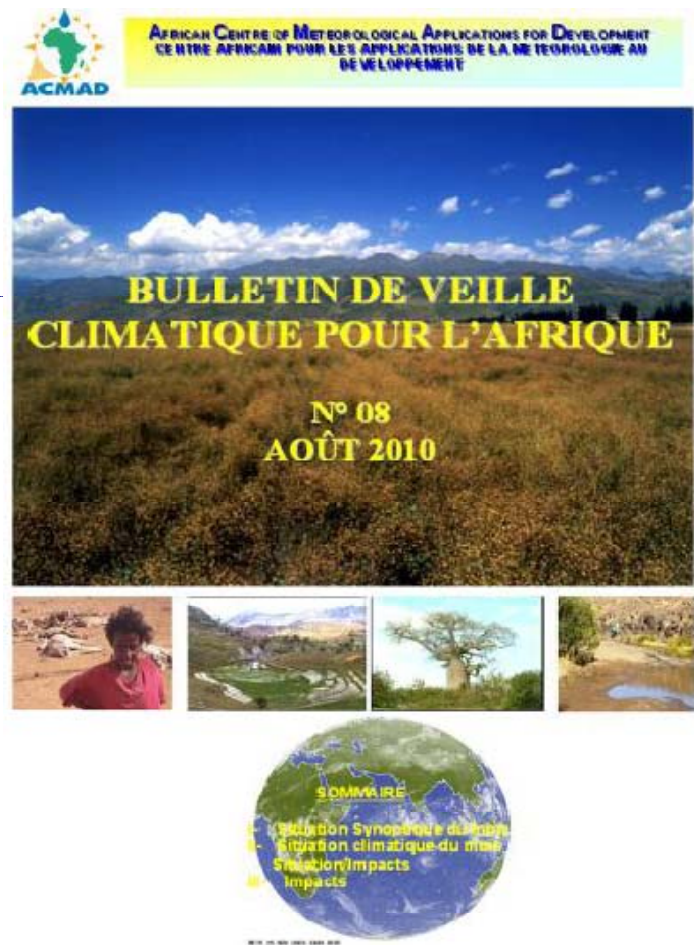
**JMA Seasonal Forecast** (Forecast initial date is 14 08 2011)  
Most likely category of Surface Temperature for SON 2011



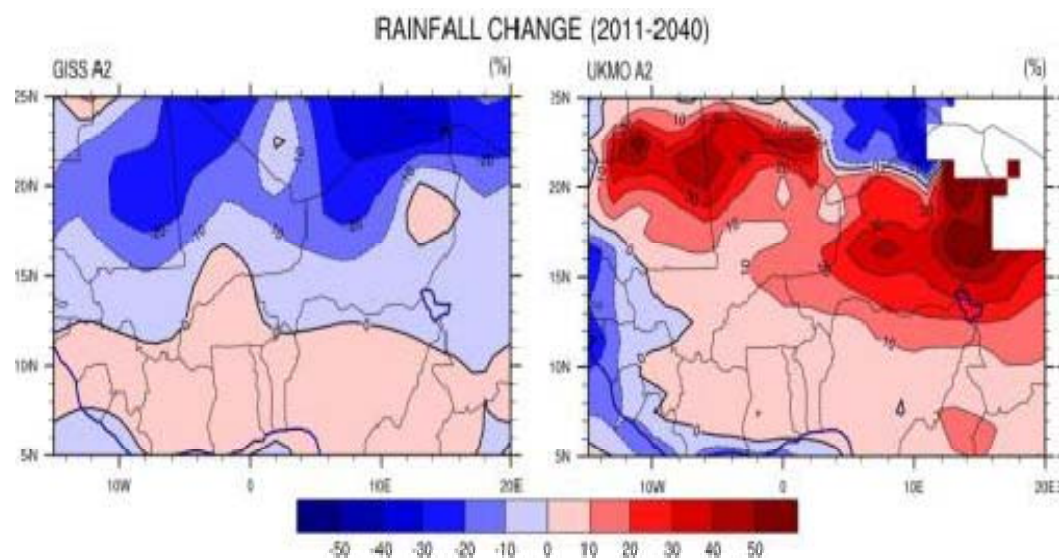


e.g.

# RCC Products



**African Pilot RCC: Monthly climate bulletin (left) and climate change scenario (below)**





# Historical review...

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- First series of Regional Climate Outlook Forums (RCOFs) in southern Africa (end of 1997)
- El Niño episode (impacts of climate variability and of the developing capabilities of forecast systems to assist in managing these impacts)
- Review meeting ,October 2000, to examine the progress of the Forums and to consider future developments in the process



### 3. Regional Climate Outlook Forums, RCOFs

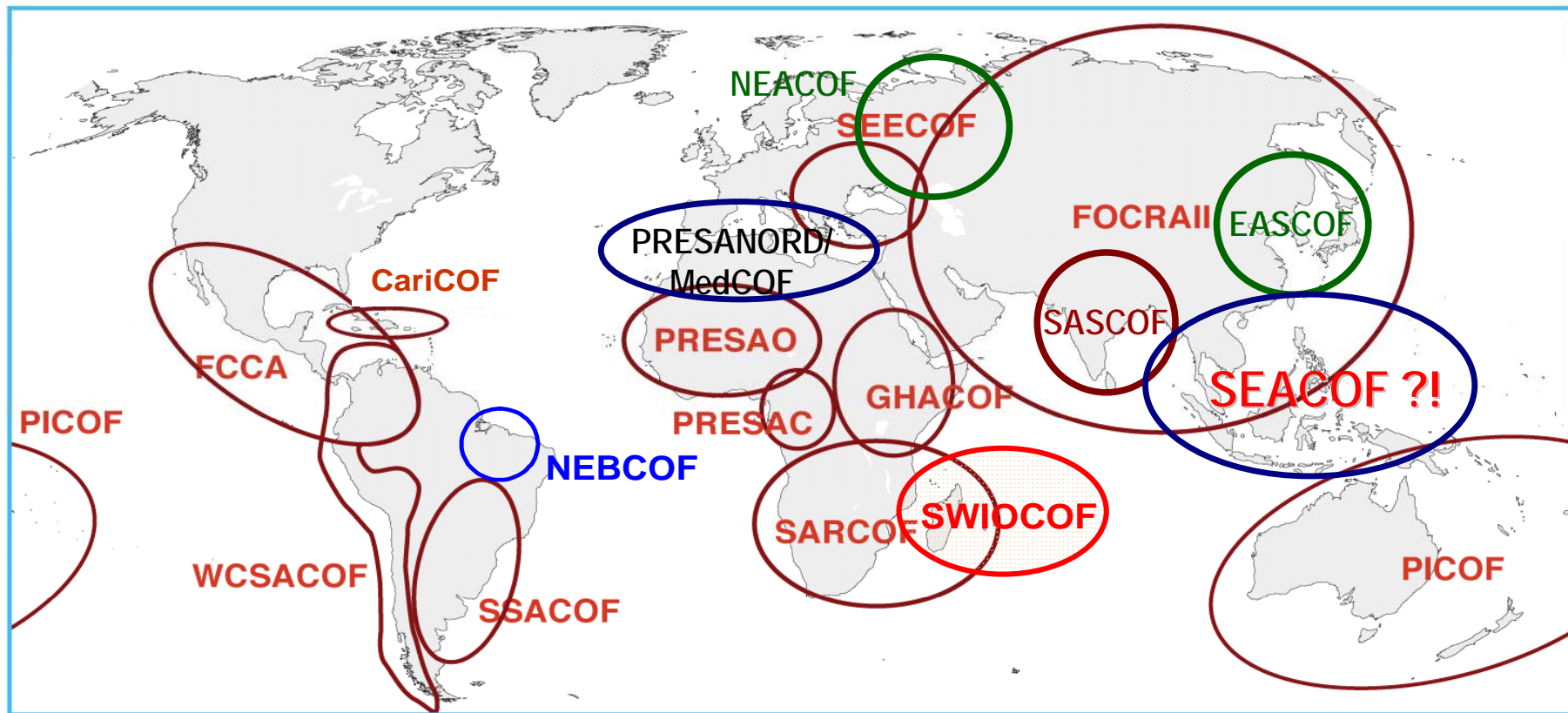
RCOFs bring together national, regional and international climate experts, on a regular basis, to produce regional climate outlooks based on input from global and regional producers of climate information as well as from NMHSs of the region concerned by:

addressing regions of common climate characteristics  
ensuring consistency in access to, and interpretation of, climate information

facilitating close user interaction to jointly assess the likely implications of the outlooks

providing training on long-range forecasting, communication etc.

# RFCOs





# IGAD Pilot RCC: Greater Horn of Africa Consensus Climate Outlook for Sep-Dec., 2013 Rainfall

Meteorological experts;  
Representatives from disaster risk management, water resources, agriculture and food security, health and development sectors  
Forum session held from 29 to 31 August 2012 in Zanzibar.

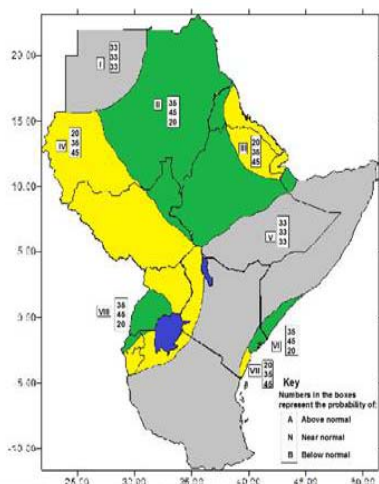


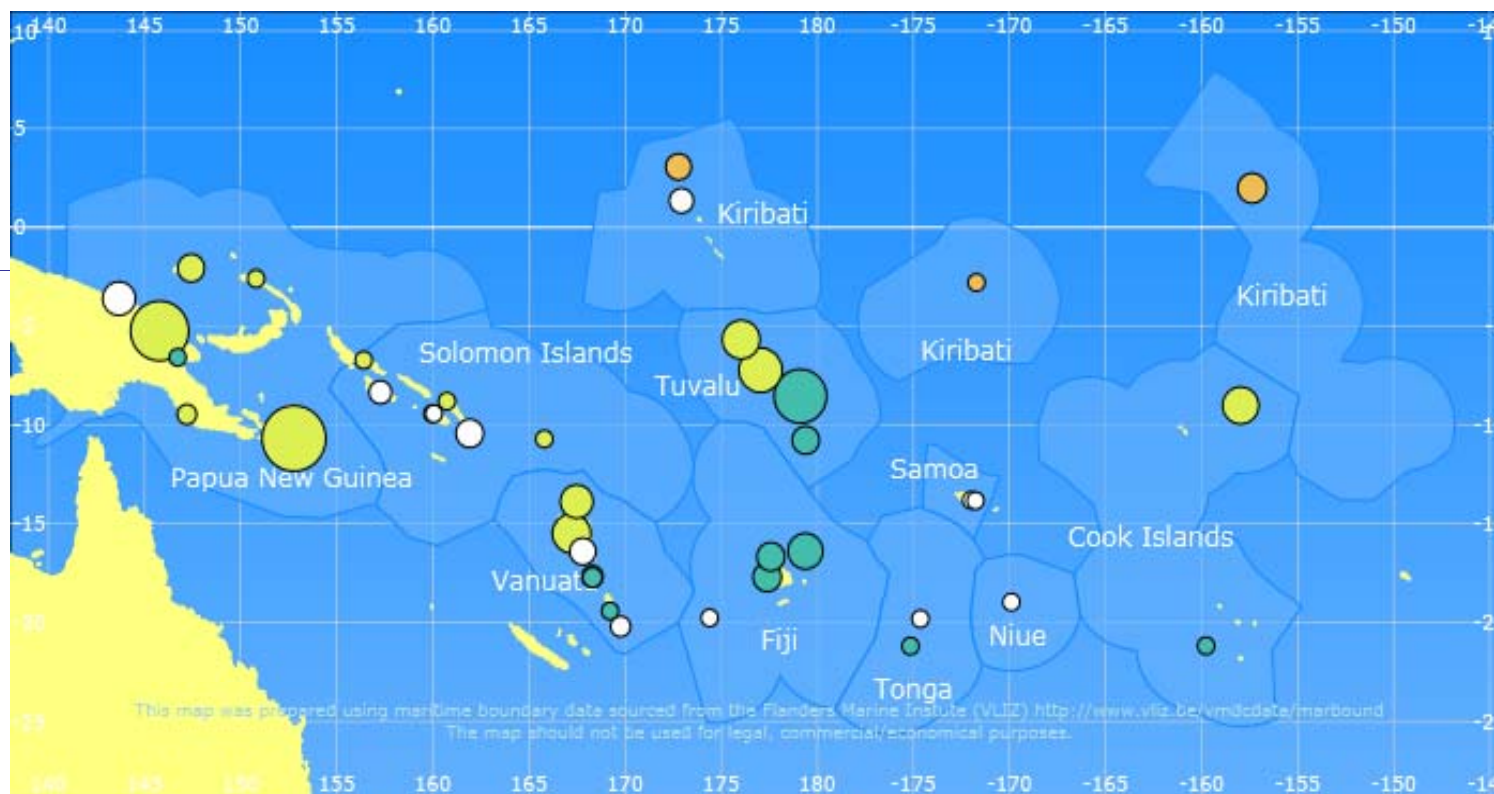
Figure 1: Greater Horn of Africa Consensus Climate Outlook for the June to August 2013 rainfall season

**The Greater Horn of Africa Climate Outlook Forum has concluded that, in the forthcoming September-December rainy season, most parts of the region are likely to receive near normal to above normal rainfall....**



# The Online Climate Outlook Forum (OCOF), also known as the Pacific Islands online Climate Outlook Forum (PICOF)

## Seasonal Climate Outlook - Spatial Summary for the period June 2013 to August 2013



### Legend

- Bias towards below-normal rainfall
- Bias towards normal rainfall
- Bias towards above-normal rainfall
- No bias in forecast (climatology)

Larger "bubbles" represent higher forecast skill (based on LEPS scores)



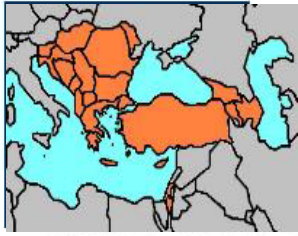
## Domain

all countries in the Mediterranean region, including countries covered by two existing sub-regional climate outlook forums in South East Europe and North Africa.

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## Components

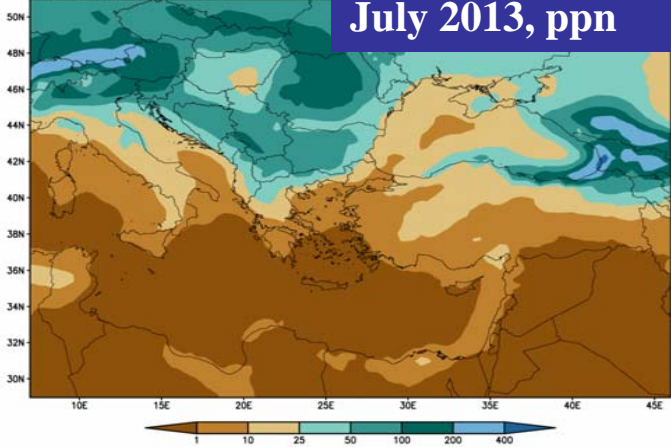
- i. Operational generation of **Seasonal Forecasts** for the Mediterranean region (in a first stage for winter and summer);
- ii. Capacity development among participating NMHSs;
- iii. Strengthening of communications with users and media.



**SEECOF (South East Europe COF)** Based on dynamical downscaling of ECMWF seasonal forecast, using a regional atmosphere-ocean coupled model ([RCM-SEEVCCC](#)).

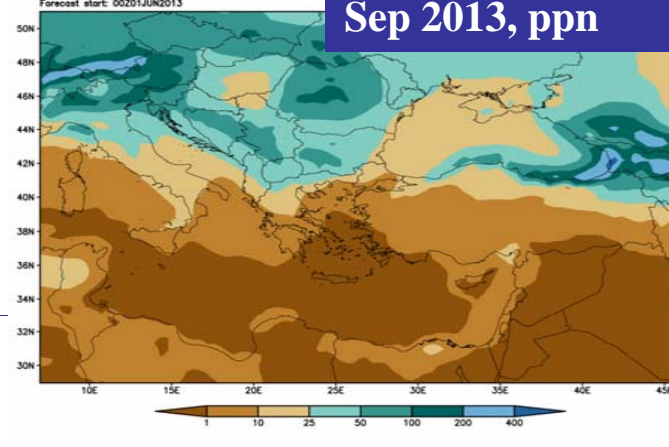
RCM-SEEVCCC: Monthly precipitation (mm) for JUL 2013  
Forecast start: 00Z01JUN2013

**July 2013, ppn**



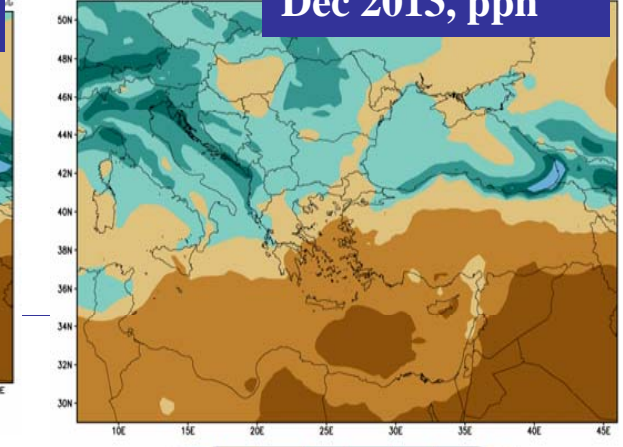
RCM-SEEVCCC: Monthly precipitation (mm) for AUG 2013  
Forecast start: 00Z01JUN2013

**Sep 2013, ppn**



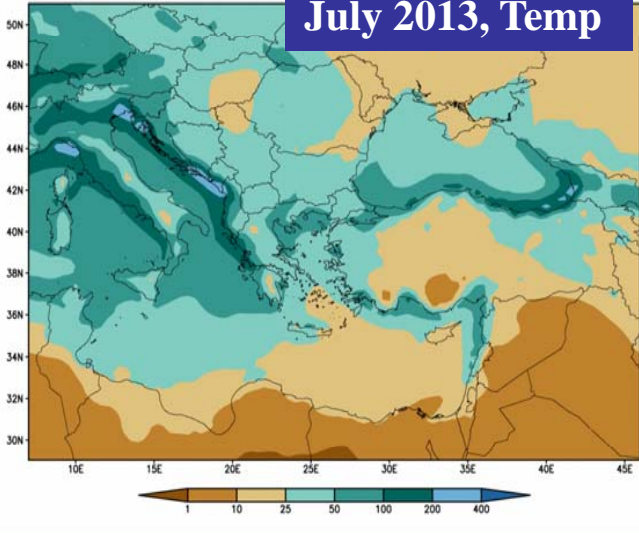
RCM-SEEVCCC: Monthly precipitation (mm) for DEC 2013  
Forecast start: 00Z01JUN2013

**Dec 2013, ppn**



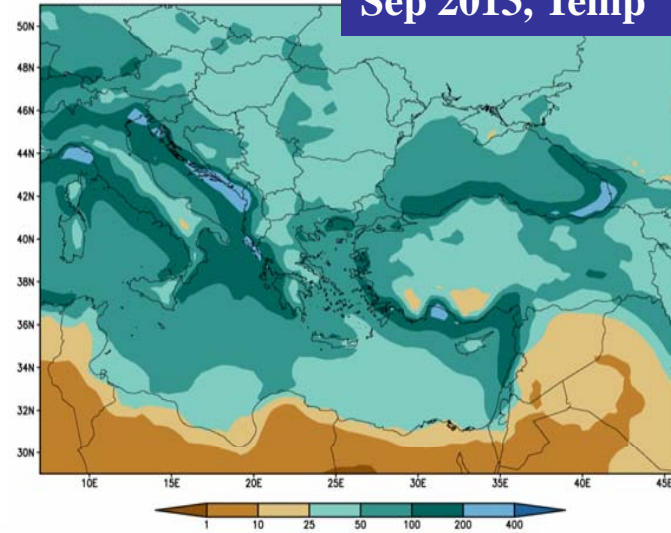
RCM-SEEVCCC: Monthly precipitation (mm) for OCT 2013  
Forecast start: 00Z01JUN2013

**July 2013, Temp**



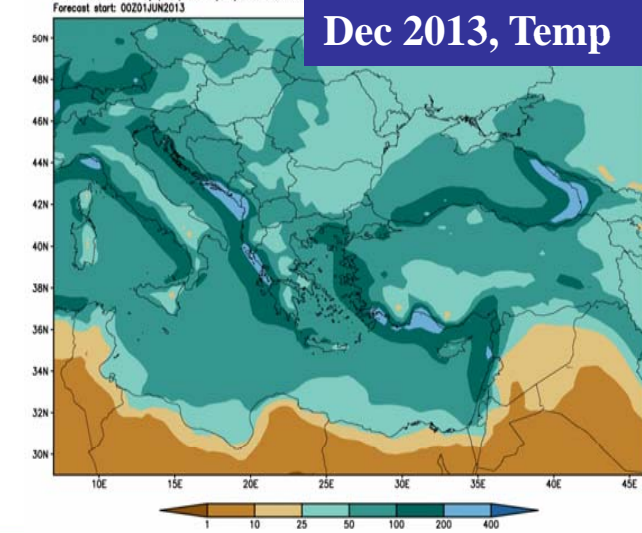
RCM-SEEVCCC: Monthly precipitation (mm) for NOV 2013  
Forecast start: 00Z01JUN2013

**Sep 2013, Temp**



Forecast start: 00Z01JUN2013

**Dec 2013, Temp**





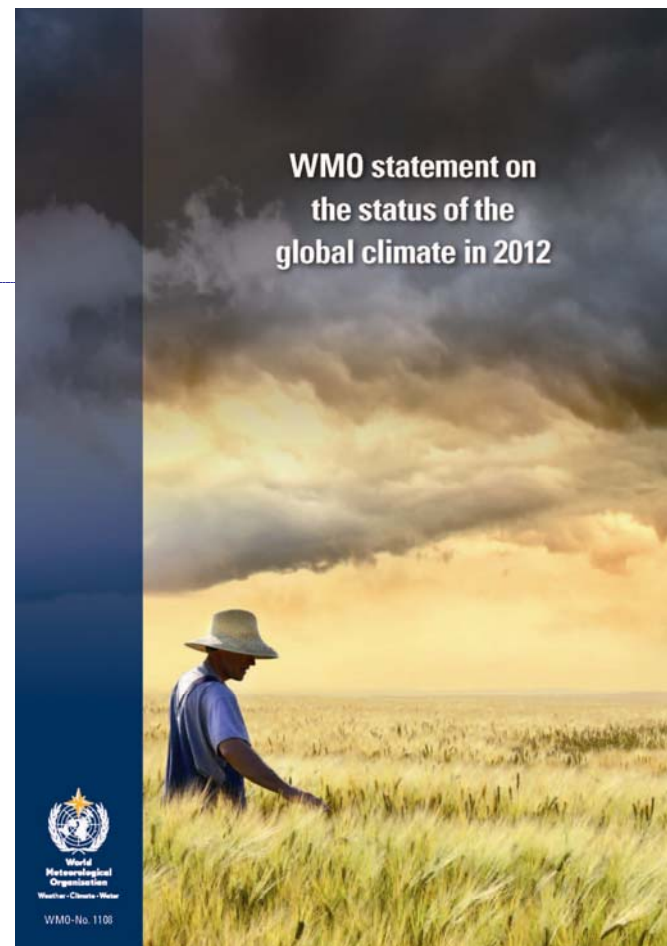


# Annual WMO Statement

Each year WMO produces its Statement on the **Status of the Global Climate**

The activity consists of a press release mid December and the publication of a 12-page brochure in March of the following year

The brochure provides information mainly about global temperature, regional temperature and precipitation patterns, hazards, droughts and floods, tropical cyclones, ENSO, Arctic Sea Ice. A feature article informs on a subject of interest attached to the content of the brochure.





## WMO El Niño/La Niña Updates

*Neutral conditions (neither El Niño nor La Niña) continue in the tropical Pacific. Model forecasts and expert opinion suggest that the likelihood of El Niño or La Niña conditions developing during the first half of 2013 is low, and that neutral conditions are likely to be maintained through the boreal spring. National Meteorological and Hydrological Services and other agencies will continue to monitor Pacific Basin conditions and provide outlooks to assess the most likely state of the climate through the coming several months of 2013. ....*



# Annex RCOFs who are they

- Southeastern Europe Climate Outlook Forum (SEECOF)
- Greater Horn of Africa Climate Outlook Forum (GHACOF)
- Southern African Regional Climate Outlook Forum (SARCOF)
- Climate Outlook Forum for West Africa  
(PRESAO : PRÉvisions Saisonnières en Afrique de l'Ouest)
- FOCRAII : Forum on Regional Climate Monitoring, Assessment and Prediction for Regional Association II (Asia) Southeast of South America Climate Outlook Forum (SSACOF).....
- The Island Climate Update (ICU)
- Pacific Islands online Climate Outlook Forum (PICOF)
- Climate Outlook Forum for Central America
- North Eurasian Climate Outlook Forum (NEACOF)



## Annex

### Minimum Functions of GPCs

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- Predictions for averages, accumulations, or frequencies over 1-month periods or longer; typically, anomalies in 3-month-averaged quantities is the standard format for seasonal forecasts. Forecasts are usually expressed **probabilistically**
- Lead time: 0 - 4 months
- Issue frequency: monthly or at least quarterly
- Delivery: graphical images on GPC website and/or digital data for download
- Variables: T2, ppn., SST, msl P, .....
- Long-term forecast skill assessments, using measures defined by the **SVSLRF** (WMO Standard Verification System for Long-Range Forecasts)



## Annex

The officially designated  
WMO Global Producing Centers (GPCs) of Long Range Forecasts:

- Bureau of Meteorology (BoM), Australia  
<http://www.bom.gov.au/climate/ahead/>
- China Meteorological Administration (CMA)/Beijing Climate Center (BCC)  
<http://bcc.cma.gov.cn/en/>
- Climate Prediction Center (CPC), NOAA, United States of America <http://www.cpc.ncep.noaa.gov/>
- European Centre for Medium-Range Weather Forecasts (ECMWF) <http://www.ecmwf.int/products/forecasts/seasonal/>
- Japan Meteorological Agency (JMA)/Tokyo Climate Centre (TCC) <http://ds.data.jma.go.jp/gmd/tcc/tcc/index.html>
- Korea Meteorological Administration (KMA) <http://www.kma.go.kr/>
- Météo-France <http://www.meteo.fr>
- Met Office (United Kingdom) <http://www.metoffice.gov.uk/research/seasonal/>
- Meteorological Service of Canada (MSC) [http://www.weatheroffice.gc.ca/saisons/GPC\\_Montreal\\_e.html](http://www.weatheroffice.gc.ca/saisons/GPC_Montreal_e.html)
- South African Weather Services (SAWS) <http://www.weathersa.co.za/>
- Hydrometeorological Centre of Russia <http://wmc.meteoinfo.ru/season>
- Center for Weather Forecasts and Climate Studies/National Institute for Space Research (CPTEC/INPE), Brazil  
<http://clima1.cptec.inpe.br/gpc/>



## Annex

In addition, WMO has also designated the following Lead Centres:

- WMO Lead Center for Long Range Forecast Multi-Model Ensemble (LC-LRFMME)  
Jointly coordinated by KMA and NOAA/NCEP  
<http://www.wmolc.org/>
- WMO Lead Center for Standard Verification System of Long Range Forecasts (LC-SVSLRF) Jointly coordinated by BoM and MSC

<http://www.bom.gov.au/wmo/lrfvs>



## Annex

Other major centers providing global seasonal forecasts:

- International Research Institute for Climate and Society (IRI), USA  
<http://portal.iri.columbia.edu/>
- APEC (Asia-Pacific Economic Cooperation) Climate Center (APCC), Republic of Korea  
[http://www.apcc21.net/eng/service/fore/lmon/japcc030101\\_Is\\_t.jsp](http://www.apcc21.net/eng/service/fore/lmon/japcc030101_Is_t.jsp)



## Annex Mandatory Functions of RCC

WMO RCCs shall perform the following minimum set of mandatory functions covering the domains of long-range forecasting (LRF), climate monitoring, data services and training:

- **Interpret and assess LRF products from GPCs**, including the exchange of basic forecasts and hindcast data
  - Generate regional **tailored products, including consensus-based seasonal climate outlooks**
  - Provide online access to RCC products
  - Perform regional climate diagnostics
  - Develop regional climate datasets
  - Establish a regional historical reference climatology
  - Provide climate archiving services
  - Implement a regional Climate Watch
  - Coordinate training for RCC users
  - Provide information on RCC products and guidance on their use
- In addition, depending on a region's specific





## Annex

# The implementation and designation of WMO RCCs

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The implementation and designation of WMO RCCs typically include the following general steps (for a more detailed list of recommended steps, please contact the WMO Secretariat):

- Survey on regional needs for, and capacity to deliver, WMO RCC services leading to a statement of requirements of the regional association
- Implementation plan for WMO RCCs in the regional association including identification of potential hosts
- Pilot phase (1 to 4 years) in order to implement, demonstrate and consolidate the RCC-related products and services
- Initiation of the official designation process through the president of the regional association according to the designation procedure defined in the *WMO Manual on the Global Data-processing and Forecasting System (WMO-No. 485)*
- Designation process overseen by the WMO Commission for Climatology and WMO Commission for Basic Systems, including a demonstration of the applicants' capabilities regarding the WMO RCC services required
- Official designation by the WMO Executive Council and the WMO Congress



# Shukran

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Jaser Rabadi, Ph.D.,  
WMO Representative for West Asia

UN House

PO Box 26814

Manama, Bahrain

[Jrabadi@wmo.int](mailto:Jrabadi@wmo.int), [jaser.rabadi@gmail.com](mailto:jaser.rabadi@gmail.com)

Office: 00 973 173 19 401

Fax : 00 973 173 11 607

Cell: 00 973 390 64 305

Roaming cell: 00 962 777 64 33 66