

Technical aspects of RCC Operations:  
Overview of Mandatory and Highly Recommended Functions and related aspects

**Climate Monitoring**

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**WMO OMM**

World Meteorological Organization  
Organisation météorologique mondiale

**WMO International Workshop on Global  
Review of RCC Operations, Pune, India,  
12 – 14 November 2018**

# Operational Activities for Climate Monitoring: where defined?

- **Mandatory functions:** A minimum set of functions, criteria and products are defined in the *Manual on the GDPFS, Part II*, in Appendix II-11.
- Additional requirements for RCC functions may vary in detail from Region to Region. A list of '**highly recommended**', but not mandatory, functions is given in Attachment II-10.

# Mandatory Functions of an RCC Climate Monitoring Node (minimum requirements)

- Perform **climate diagnostics** including analysis of **climate variability** and **extremes**, at **regional** and **sub-regional** scales;
- Establish a historical **reference climatology** for the region and/ or sub-regions;
- Implement a regional **Climate Watch**.



# Mandatory Function 1: Climate Diagnostics

- **Products:** climate diagnostics **bulletins** including tables, maps and related products
- **Element:** Mean, Max and Min **temperatures**, Total **precipitation**; other elements (esp. GCOS essential climate variables) to be determined by the Region,
- **Update frequency:** monthly

# Example:

## Monthly RA VI Bulletin

- Includes:
  - Monthly maps of several variables
  - Extreme event maps
  - Graphs of circulation indices and short discussion
  - Tables of monthly extremes
  - Maps of weather type episodes
  - Last but not least: Discussion of special weather events and anomalies, based on national contributions of NMHSs
  - Planned: Time series of European averaged temperature
- Also provided:
  - Seasonal Bulletin (not mandatory)
  - Annual Bulletin (mainly based on national contributions)
  - Contributions to annual publications:
    - BAMS State of the Climate
    - WMO Statement on the Status of the Global Climate



### Monthly Bulletin on the Climate in WMO Region VI

- Europe and Middle East -

August 2018

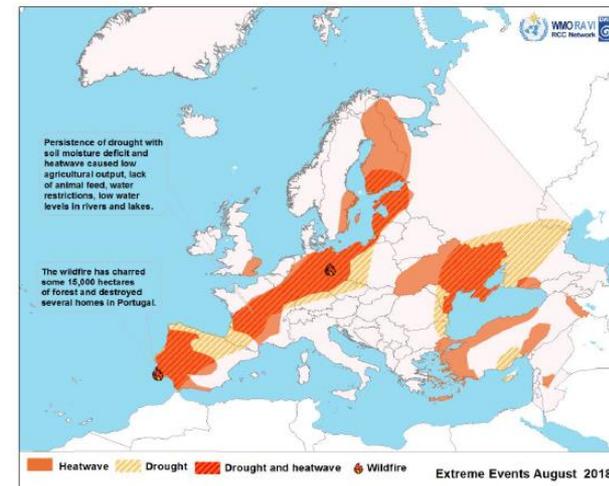
Deutscher Wetterdienst

Issued: 21 September 2018



### Highlights

- Warm and dry August with plenty of sunshine in most Europe
- Many wild fires



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# Processing chain of Climate Monitoring Maps and Bulletins in RA VI RCC

**Input data** provided by data centres inside DWD (GPCC, CM SAF, GCC, ...) or outside (ECA&D, ...)

**Data processing:** Quality check, Interpolation/gridding (GIS, Python), Averaging, computation of indices

**Mapping:** Transformation to rotated grid (CDO), plot of maps (R)

**Transfer** of image files to web server, display on the web, visual quality control, also transfer to GISC Offenbach (RCC Offenbach is DCPC)

Image files also used in **bulletins and reports** + additional information from the web and contributions from other NMHSs, summarised in texts

**Targeted users** in RCC: mainly other NMHSs, but also general public and internal users in DWD

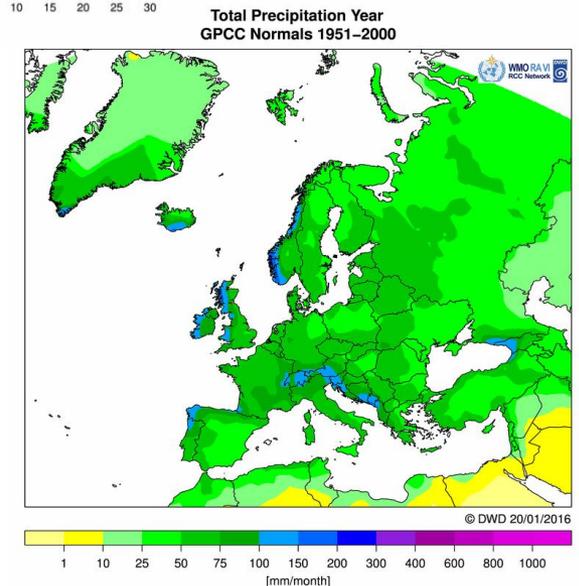
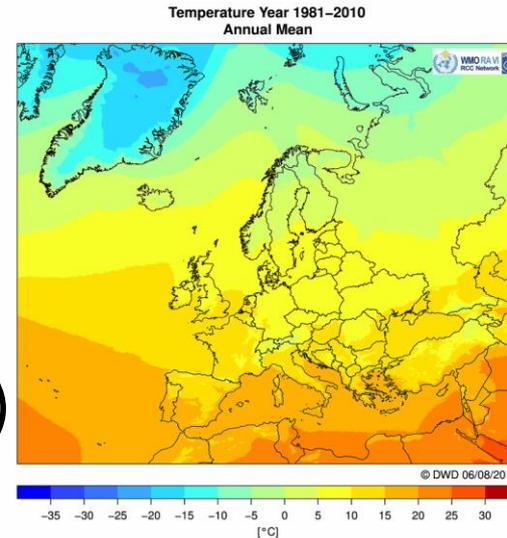
# Mandatory Function 2: Historical Reference Climatology

- **Product:** Database of climatological means for various reference periods (e.g. 1931-60; 1951-80; 1961-90; 1971-2000; etc.)
- **Spatial resolution:** *By station*
- **Temporal resolution:** *Monthly at a minimum*
- **Elements:** Mean, max and min temperatures, total precipitation; other elements (esp. GCOS Essential Climate Variables, ECVs) to be determined by the region,
- **Update frequency:** At least every 30 years, preferably every 10 years

# Example:

## Reference Climatologies of RA VI

- Available for several ECVs (grids and maps)
- Some based on station interpolation (e.g. T, RR), others on satellite (e.g. global radiation, cloud cover) or model data (e.g. SLP)
- Reference periods mostly 1961-90 and 1981-2010, others due to data availability
- Monthly resolution



# Mandatory Function 3

## Implement a Regional Climate Watch

- **Products:** Climate advisories and information for RCC Users
- **Update:** Whenever required, based on the forecast of significant regional climate anomalies.

# Example: Climate Watch System in RA VI



## Climate Watch Advisory

- Based on RCC monitoring maps and weekly/ monthly/ seasonal forecasts of several models
- Expert discussion of results, decision after consultation of RCC partners (CM and LRF nodes) to reach consensus
- Advisories are sent to all NMHSs concerned and RCC partners (CM/ LRF Nodes) and provided on the RCC website including map (password protected)
- Planned: include past impact information of similar events from Climate Knowledge Data Base on Extreme Events (KRONER), operated by DWD



Guidance on **drought** ID: 201808-u10

**Area concerned:** Particularly parts of western and central Europe (France, Netherlands, Belgium, Luxembourg, Germany, Poland, Czech Republic)

Initial statement issued on 6 July 2018  
First update issued on 20 July 2018  
Second update issued on 3 August 2018  
Third update issued on 17 August 2018  
Fourth update issued on 24 August 2018  
Fifth update issued on 07 September 2018  
Sixth update issued on 19 September 2018  
Seventh update issued on 2 October 2018  
Eighth update issued on 16 October 2018  
Ninth update issued on 24 October 2018  
Tenth update issued on 2 November 2018

**Valid:** Begin: on 6 November 2018      **End:** 12 November 2018

**To:** Climate Watch focal points of NMHSs: France, Netherlands, Belgium, Luxembourg, Germany, Poland, Czech Republic

The RA VI RCC Network Offenbach Node on Climate Monitoring (RCC Node-CM) is responsible for providing Climate Watch guidance information for NMHSs' own consideration for issuing climate advisories for their territory.

After having consulted the consortium partners of the RCC Node-CM and RCC Node-LRF (RA VI RCC Network Toulouse and Moscow Node on Long-Range Forecasting), RCC Node-CM issues the following guidance information:

Due to the results from monthly forecasts we expect:

"A continuation of the drought situation for at least the next week for parts of western and central Europe is expected. The probability is locally more than 70% that precipitation will be below the lower tercile.

This drought may be accompanied by water scarcity, low river levels and harvest losses since soil moisture is reduced."

This information should be used as guidance for the National Meteorological and Hydrological Services (NMHS) in a pre-operational mode. It is up to the above mentioned NMHSs to closely monitor the status and evolution of the current climate conditions and to consider issuing a national Climate Watch Advisory. RCC Node-CM would appreciate feedback from NMHS whether this information was helpful. Also, any suggestion on further pieces of information needed by NMHS is highly welcomed!

On demand we provide you with a template for a national climate watch advisory as agreed among the climate watch pilots and RCC Node-CM.

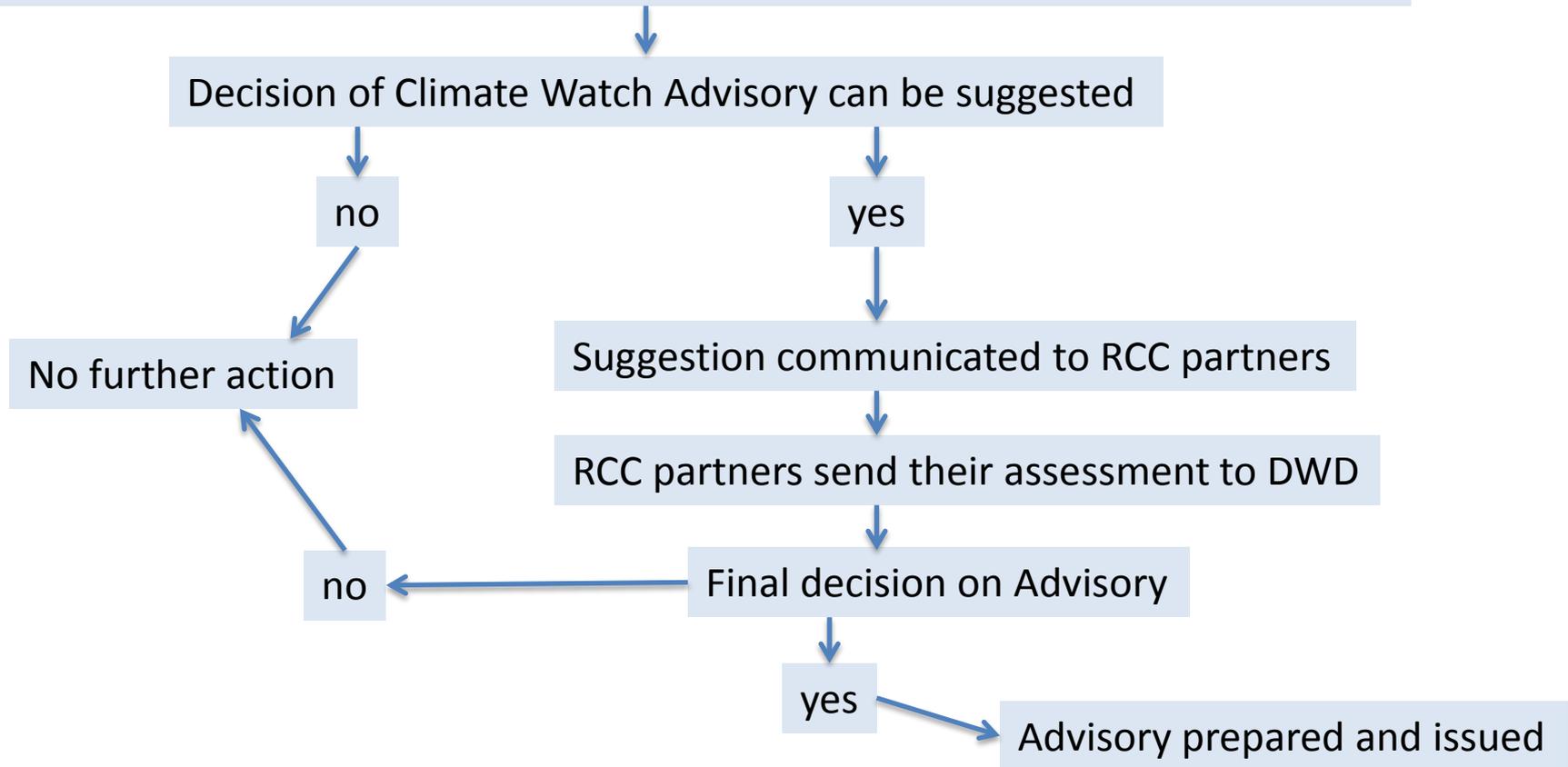
Please note that further information can be obtained from RCC Node-CM website ([www.dwd.de/rcc-cm](http://www.dwd.de/rcc-cm)) concerning Climate Monitoring and from RCC Node-LRF websites (<http://seasonal.meteo.fr/en>, <http://ineacc.meteoinfo.ru/forecast>) concerning Long-Range Forecast or by e-mail to [rcc.cm@dwd.de](mailto:rcc.cm@dwd.de) or [rcc-lrf-mf@meteo.fr](mailto:rcc-lrf-mf@meteo.fr). For ECMWF member's further information on monthly forecasts after logging in is provided at <http://www.ecmwf.int/> ->Forecasts

We will monitor the evolution of the anomaly, issue updates if significant change arise and close the advice when no clear signal can be detected in the forecasts.

On behalf of the RCC Node-CM Team

# Climate Watch Processing Chain at RCC Node-CM

Discussion of Monitoring and Forecast results by 2 experts at DWD twice a week



# Highly Recommended Functions for Climate Monitoring (1)

- *From the Manual on the GDPFS, Part II, new ATTACHMENT II-10:*
  - Non-operational data services
    - Keep abreast of activities and documentation related to WMO WIS, and work towards WIS compliance and DCPC designation;
    - Assist RCC Users in the development and maintenance of software modules for standard applications;
    - Generate indices of climate extremes;
    - Provide expertise on interpolation techniques;



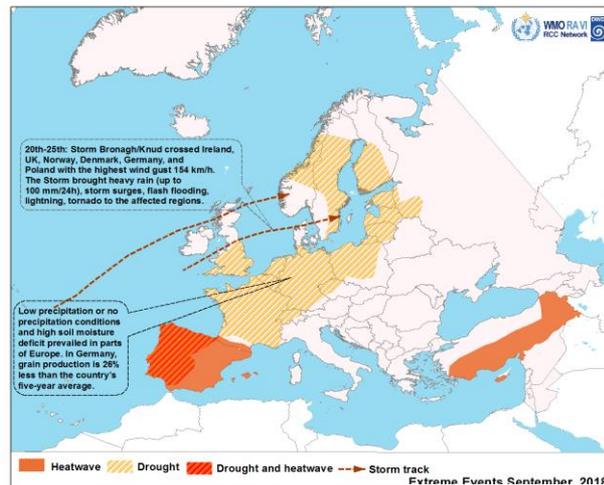
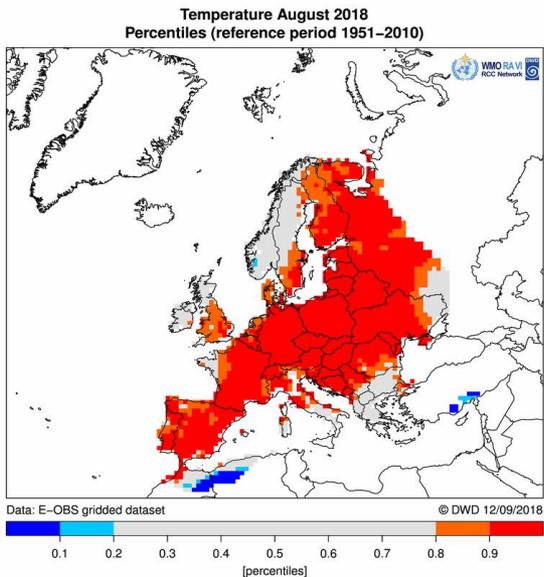
# Highly Recommended Functions for Climate Monitoring (2)

- *From the Manual on the GDPFS, Part II, new ATTACHMENT II-10 and RA VI RCC Operation Plan:*
  - Research and Development
    - Develop a climate Research and Development agenda and coordinate it with other relevant RCCs;
    - Improvement of data base / methods / reprocessing of present products
    - Promote studies of regional climate variability and change, and impact in the Region;
    - Develop products for extreme event monitoring: Percentile maps, event maps, event calendar, maps and diagrams of heat and cold waves, climate knowledge data base on extreme events
    - Promote research and development on circulation types and its impact on climate
    - Develop consensus practices to handle divergent climate information for the Region;
    - Promote the use of proxy climate data in long-term analyses of climate variability and change;
    - Promote application research, and assist in the specification and development of sector specific products;
    - Promote studies of the economic value of climate information.
  - Coordination Functions (mentioned in previous presentation)



# Example:

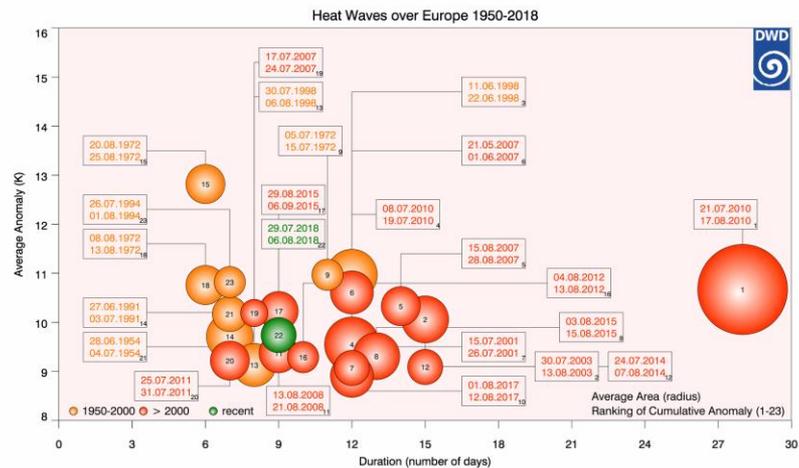
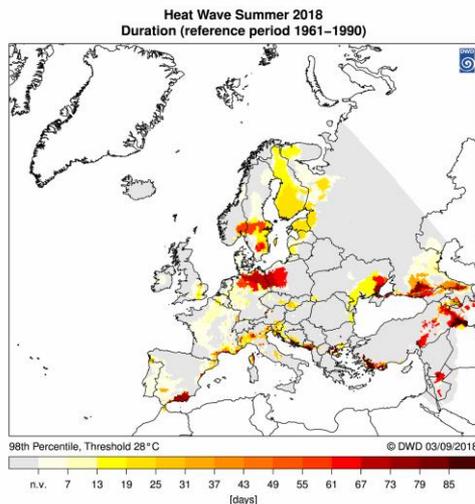
## Highly Recommended Products of RA VI RCC Node-CM



Extreme event maps

### Percentile maps

Maps of heat wave parameters (e.g. duration)



Time series of heat waves as bubble diagram

# Sub-regional products and functions

- *Sub-regional products are useful, especially when the concerned Region is very large and the climate within the Region is not homogeneous. (This is normally the case in every large Region.)*
- *Especially when the RCC is organised as a network, it is useful when some partners focus on the whole Region while others focus on sub-regions, dependent on their individual experience and expertise.*



# Example:

## Sub-regions in RA VI

- The RA VI RCC Node on Climate Monitoring consists of 6 Partners: the NMHSs of Germany (lead), Netherlands, France, Serbia, Turkey, Armenia.
- While Germany, France and the Netherlands provide products for the whole Region, the others have taken responsibility for subregions:
  - Serbia for **southeast Europe** via the SEEVCCC;
  - Turkey for the **eastern Mediterranean** via the EMCC;
  - Armenia for the **South Caucasus**



# Role in RCOF Activities

*RCCs play a central role in RCOFs because they can provide much of the guidance material. This concerns especially the Nodes on Long-Range Forecasting (LRF), but also the Nodes on Climate Monitoring (CM). In particular, the Nodes on CM should be able to provide the following information*

- Verification of RCOF outlooks;*
- Monitoring information about the present climate (the initialisation of the outlook)*
- Expertise/ experience on analogous situations in the past*
- Contribution to training activities;*



# User Engagement

*Target users of RCCs are mainly the NMHSs of the concerned Region. However, some of the RCC products might be useful for the general public too, others might be more specialised and are generated just for diagnostic support of the NMHS experts.*

*For that reason, a three-fold approach of user engagement might be useful:*

- To publish some of the products, which might be interesting for a broader user community on the website (e.g. climate maps and bulletins)*
- To provide some products on a password protected website (e.g. Climate Watch Advisories)*
- To hold some products ready on demand (e.g. non-mandatory products, which are not generated regularly)*



# RCC Web Portal

- See example of RA VI RCC Node-CM:

**WMO RA VI Regional Climate Centre on Climate Monitoring**

OVERVIEW THE NETWORK PRODUCTS SERVICE

Homepage > Overview

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Documents

Links

Meetings

Contact

## Overview

Regional Climate Centres (RCCs) are institutions with the capacity and mandate by WMO within the Global Framework for Climate Services (GFCS) to develop high quality regional-scale products using global products and incorporating regional information. A network of three RCC consortia was established for the WMO region RA VI (Europe and Middle East), officially named

- RA VI RCC-Network De Bilt Node on Climate Data Services
- RA VI RCC-Network Offenbach Node on Climate Monitoring
- RA VI RCC-Network Toulouse and Moscow Node on Long-range Forecastings

RCCs provide online access to their products and services to national meteorological and hydrological services and to other regional users. Vice versa, RCCs receive data, products, know-how and feedbacks from the meteorological services as a main source for regional information. By the same time, they provide regional data, products and feedbacks to Global Production Centres and Lead Centres for respective verification and product optimisation of the global-scale information.

For more details about the WMO RA VI RCC Network see the RCC Site

The RA VI RCC-Network Offenbach Node on Climate Monitoring (RCC Node-CM) will perform basic functions covering the domain of climate monitoring:

**GPCs:** Global ensemble prediction outcome (means and spreads of distribution) for the next season

**RCCs:** (Tools for) regional downscaling, assessment/interpretation for the region, training on methodologies

**RCC processes:** Consensus statements on regional forecasts

**NMHSs:** Advisories/warnings to the end users, provision of tailored seasonal outlooks to the end users

Interaction

Thank you  
Merci

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