Operational function and R&D activities in support to MHEWS in South East Europe at RHMSS-SEEVCCC

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(host of the South East European Virtual Climate Change Center - SEEVCCC)

Regional Consultation for the Design of Multi-Hazard Early Warning System (MHEWS) in Southeast Europe under the frame of IPA Project "Building Resilience to Disasters in Western Balkans and Turkey",
6-7 May 2014, WMO, Geneva.

WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS
Legal framework and mandatory function

WMO RA VI **Resolution 1** (XV – RA VI) established of Regional Climate Centere Network in Regiona Association VI (Europe): WMO RA VI RCC Network;

• Decision of WMO Commission for Basic System (XV session) related to amendments to the Manual on the GDPFS (WMO – No. 485: APPENDIX I-1 Location of WMCs and RSMCs with geographical specialization and RSMCs with activity specialization; Appendix II-10, Designation and mandatory functions of Regional Climate Centers (RCCs) and RCC-Networks; Appendix II-11 Detailed criteria for RCC mandatory functions and Attachment II-10 Additional highly recommended functions of designated RCC or RCC-Networks)

•RA VI RCC Network - Implementation Plan.

- **RA VI RCC node on Climate Services:**
  KNMI/Netherlands (Lead), Meteo – France/France, OMSZ/ Hungary, Met.No/Norway, SEEVCCC/RHMS Serbia, SMHI/Sweden, TSMS/Turkey
- **RA VI RCC node on Climate Monitoring:**
  DWD/Germany (Lead), Armstatehydromet/Armenia, Meteo – France/France, KNMI/Netherlands, SEEVCCC/RHMS Serbia, TSMS/Turkey
- **RA VI RCC node on Long-range Forecasting:**
  Meteo – France/France and ROSHYDROMET/Russian Federation (Joint lead), Met.No/Norway, SEEVCCC/RHMS Serbia, TSMS/Turkey

Overall coordination of the WMO RA VI RCC Network: DWD/Germany

WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS

Mandatory and highly recommended functions, services and products:

South East European Virtual Climate Change Center (**SEEVCCC**) hosted by Republic Hydrometeorological Service of Serbia (**RHMSS**) participate in all 3 RA VI RCC Network nodes (**Climate Data, Climate monitoring and Long range forecasting)** with the following operationally mandatory and highly recommended functions:

Functions

✓collecting climate data, monitoring and detecting climate change in SEE
✓development of seasonal and long range forecast
✓climate watch and issuing warnings on the occurrence of climate anomalies and extremes
✓climate database management and exchange of data and information

Research and development

✓development and implementation of regional climate models for climate projections
✓development and implementation of regional climate models for seasonal climate forecast
✓use of regional climate models for downscaling and/or regional reanalysis

Coordination functions

✓coordinating the development and implementation of the Framework Action Plan for Southeastern Europe in the field of climate change (SEE/CCFAP) and programs and projects in this field

Contribution to the WMO RCOF – SEECOF

More information about products of SEEVCCC: www.seevccc.rs

WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS

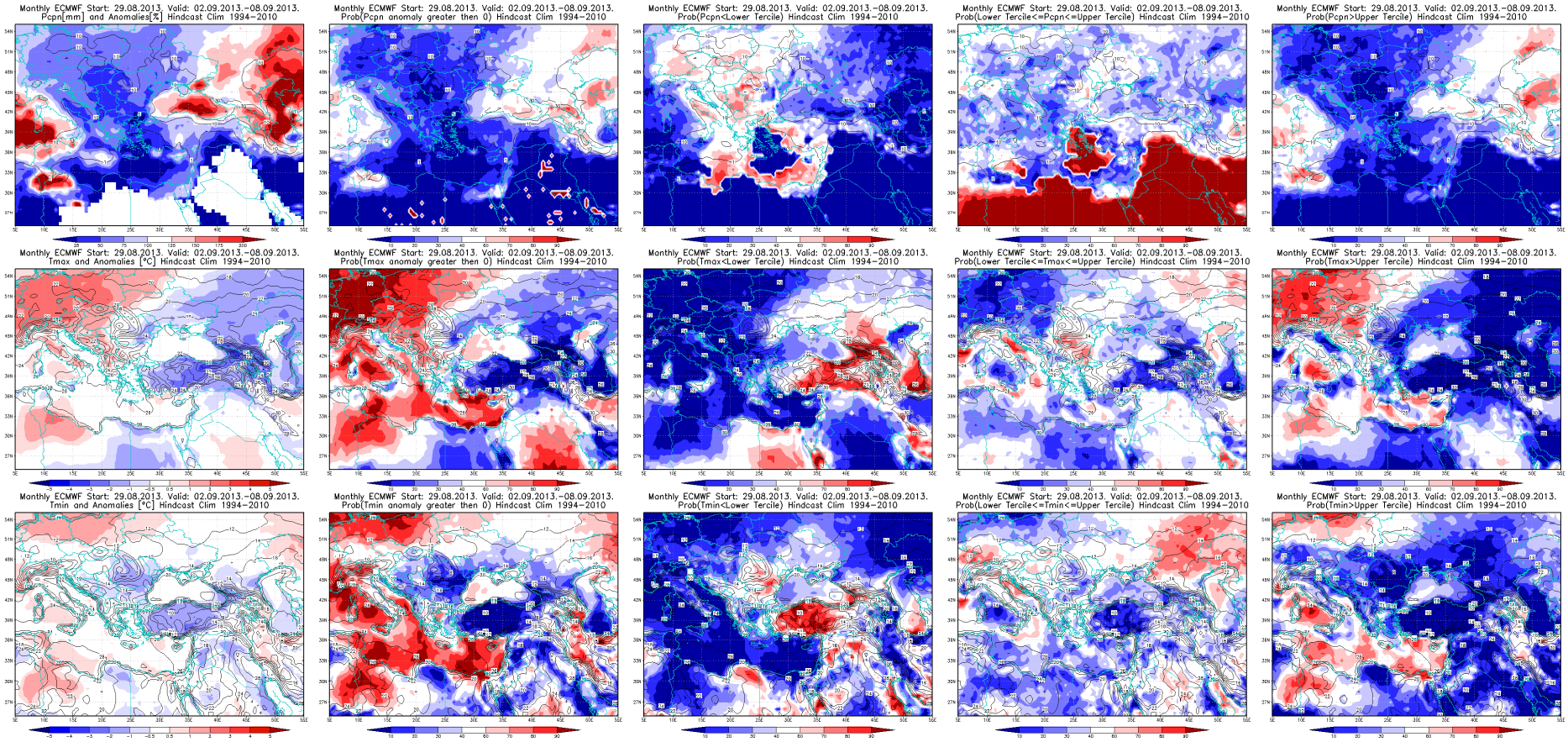
Monthly forecast - ECMWF

Weekly / monthly basis – Tmin , Tmax, precipitation

Resolution 75 km, 51 ensemble members, two times per week

Probabilistic forecast – terciles and median

Model climatology – 1994 – 2011; 5 ensemble members



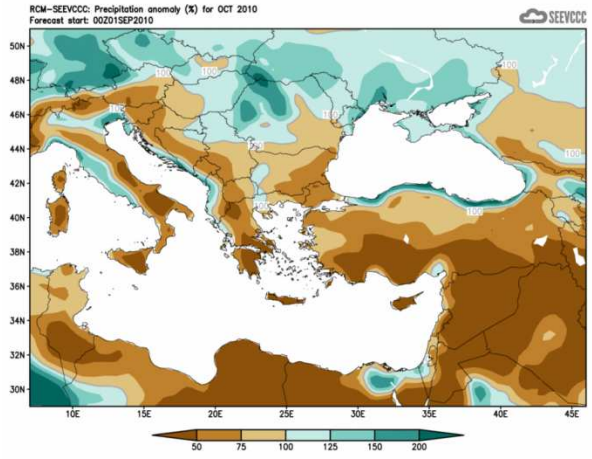
Forecast issued 29.08.2013.; valid 02-08.09.2013.

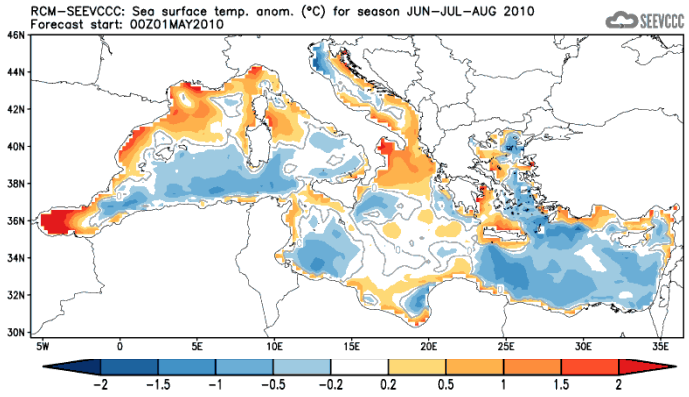
WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS
Long Range Forecast / Seasonal forecast

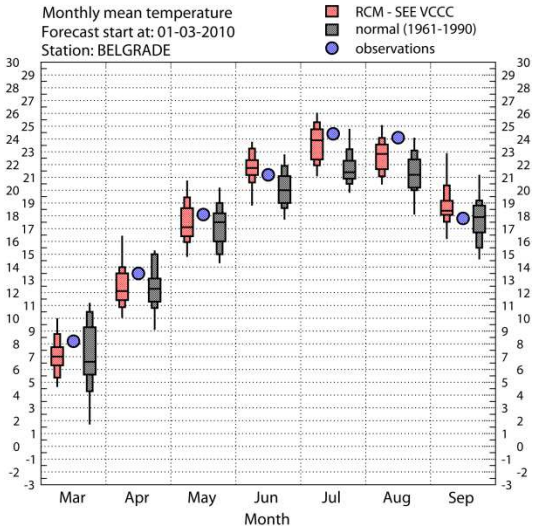
- **Probabilistic forecast** provides statistical summary of the atmosphere and ocean state in forthcoming season.

- **RCM-SEEVCCC LRF** regional dynamical downscaling using fully coupled atmosphere-ocean Regional Climate Model

  - model start: 08th of each month; operational since June 2009.
  - forecast duration: 7 months (~215 days)
  - model resolution: ~35km atmosphere ; ~20km ocean
  - model domain: Euro - Mediterranean region
    extended towards Caspian Sea
  - 51 ensemble members
  - initial & boundary conditions: ECMWF, ~75km
  - winter hindcast (1981-2010) – December run, 7 months
  - operational forecast soon available in GRIB via WIS-DCPC-Belgrade







WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS

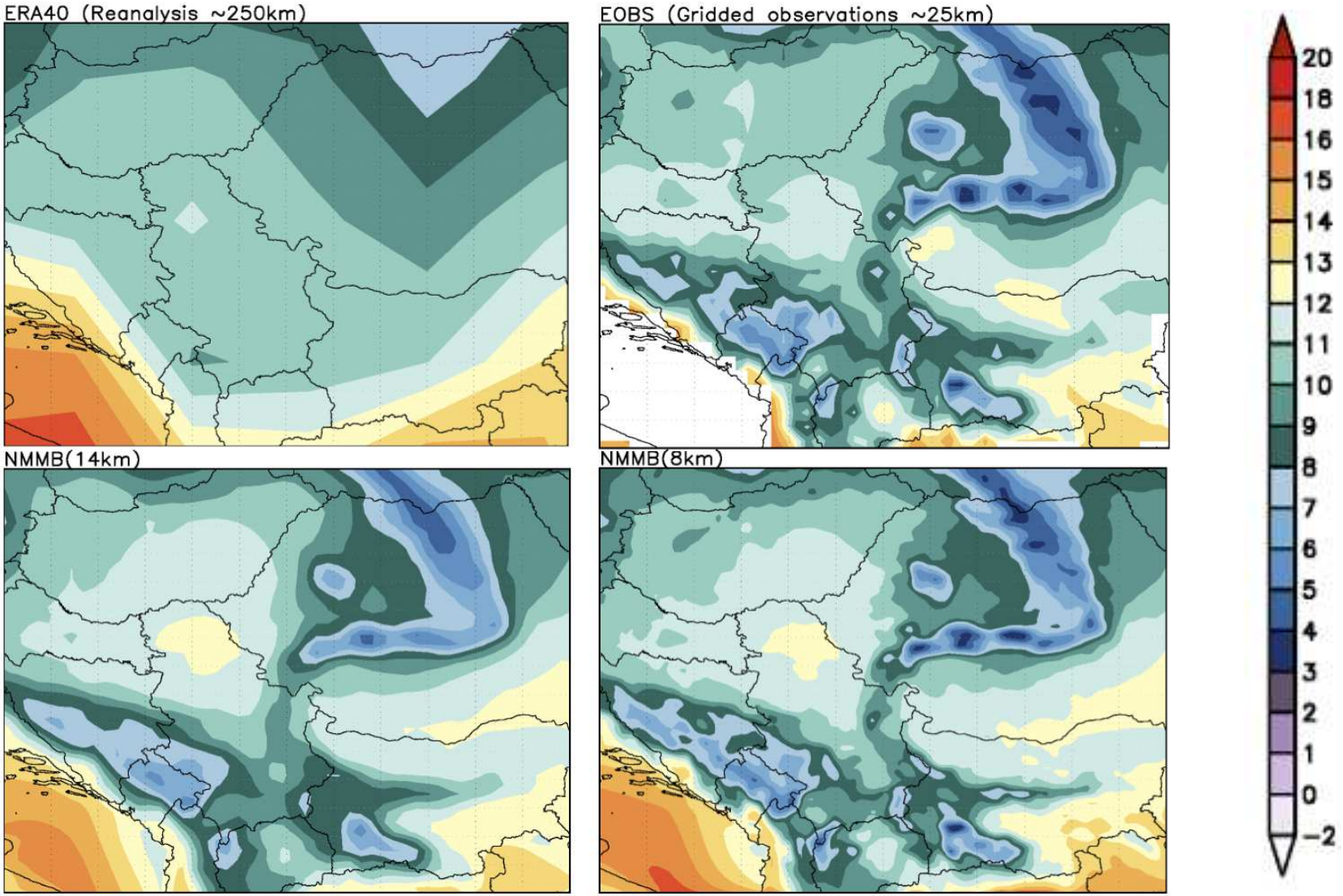
Monthly forecast : downscaling set-up

- Regional model: NMMB (Nonhydrostatic Multiscale Model)
  - Horizontal resolution: 14km and 8km experiment
- Initial and lateral boundary data: ERA40, **ECMWF, GFS (by the end of 2014)**
- Downscaled verifying period: 1971-2010 with ERA40
- Data used for verification:
  - Observations from RHMSS station network
  - EOBS, gridded climatology for EU, 25km resolution
  - ERA40 surface fields, 250km resolution
  - CARPATCLIM, gridded climatology for Carpathian region, 10km resolution

WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS

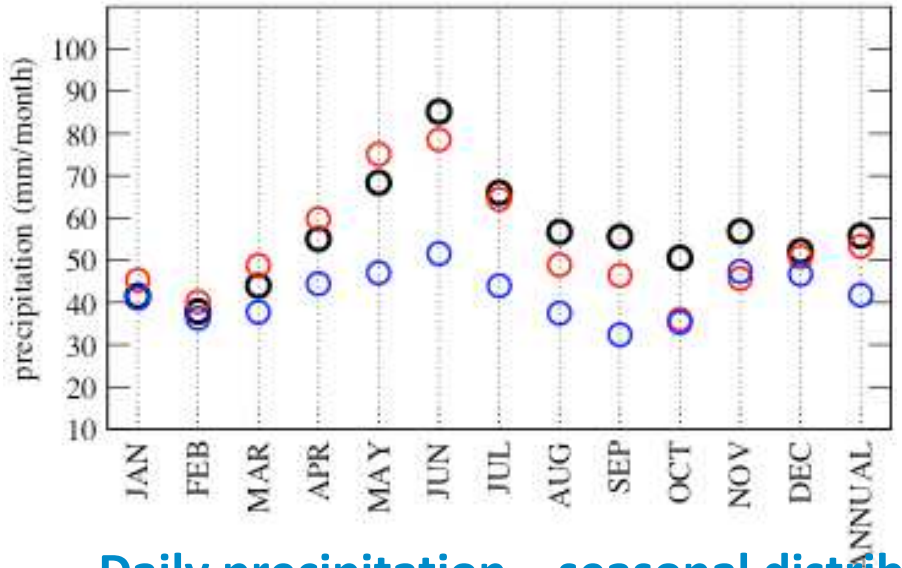
Monthly forecast : downscaling set-up - Example 1

Mean annual temperature 1971-2000



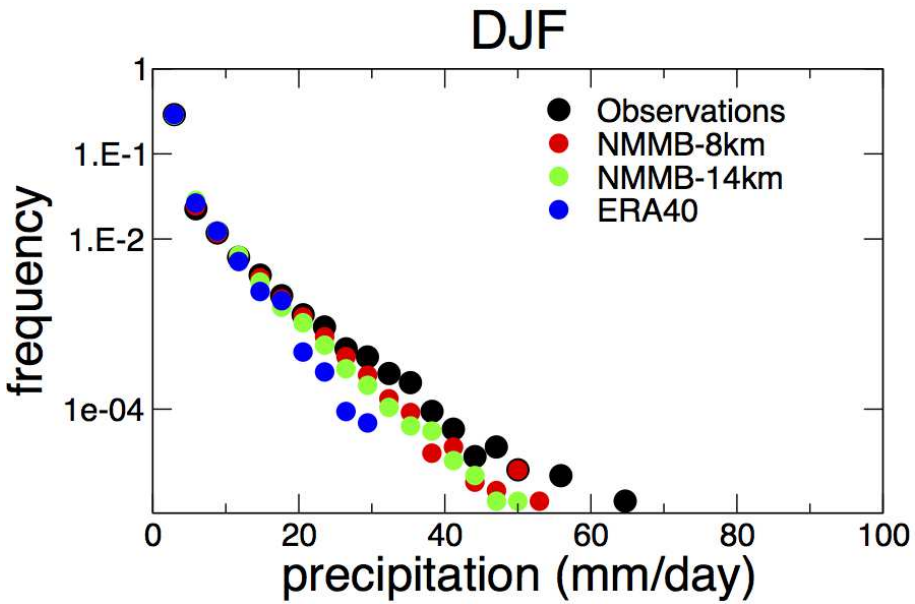
Monthly forecast : downscaling set-up - Example 2

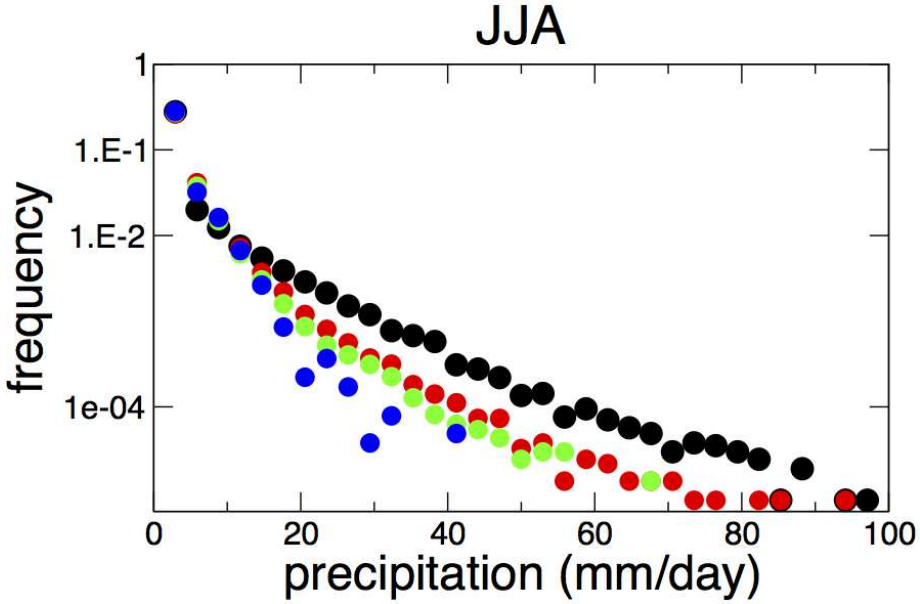
Precipitation annual cycle (monthly precipitation)



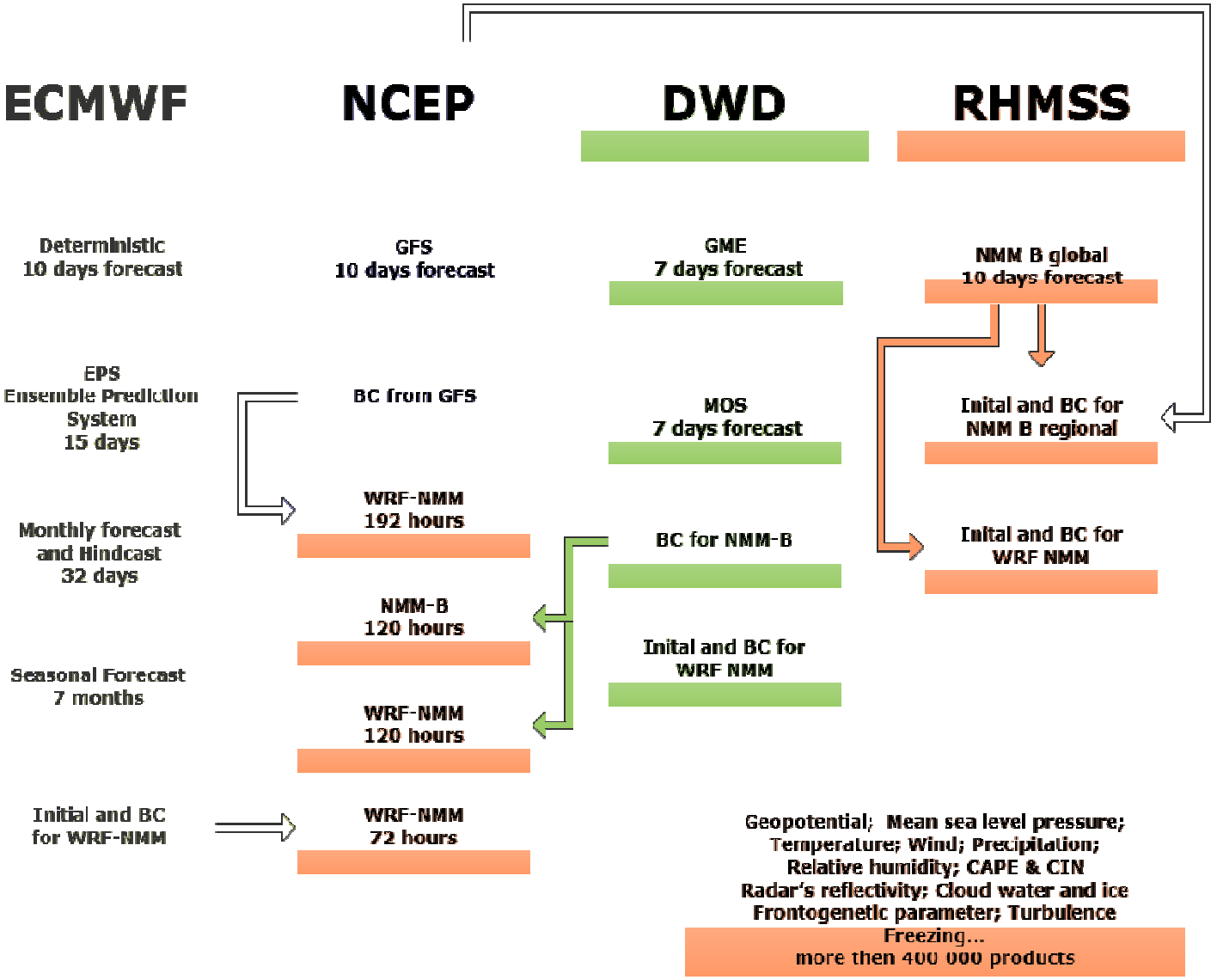
- ERA40;
- NMMB8;
- OBS

Daily precipitation – seasonal distributions

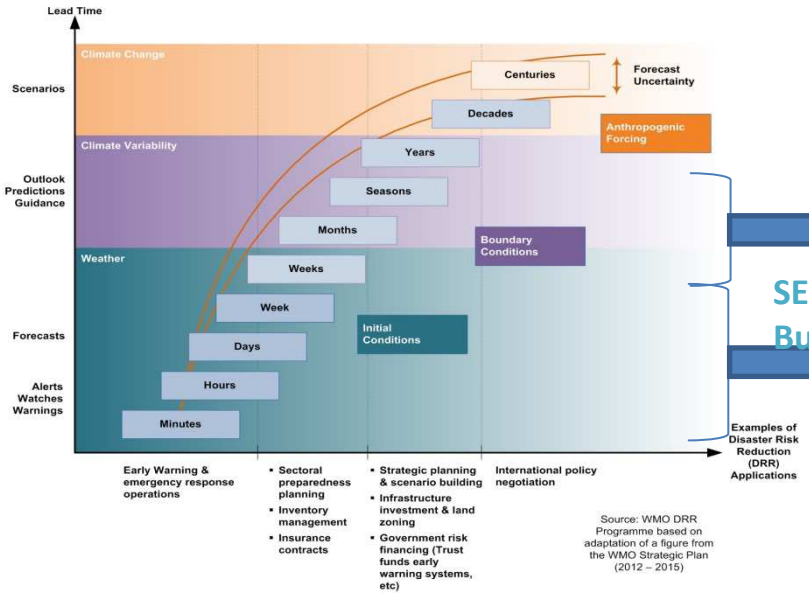




RHMSS medium and short range forecasts



Seamless Approach at SEEVCCC/RHMSS as support MHEWS system



Source: WMO DRR Programme based on adaptation of a figure from the WMO Strategic Plan (2012 – 2015)

Climate Watch System

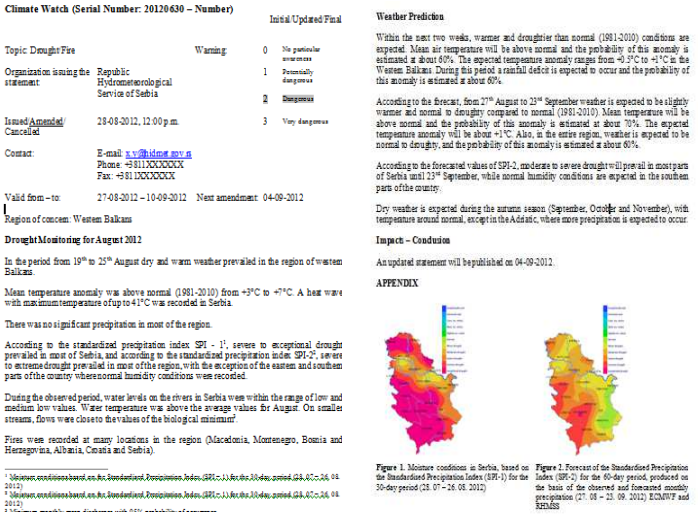
SEEVCCC seasonal forecast outputs for decision-makers CWS Bulletin

Early warning system

Operational hydrometeorological bulletin and flash warning

Seasonal forecast outputs for decision-makers CWS Bulletin - Example

Following the WMO documents (WMO/TD No 118x, WCDMP No 74, WCDMP No 75, WMO/TD No 1269, WCDMP No 58, WMO/TD No 1565) we started issuing CW advice for Western Balkans in the summer 2012.



Climate Watch (Serial Number: 20120630 – Number)

Initial/Updated/Final

Topic: Drought/Fire — Warning: 0 No particular awareness; 1 Potentially dangerous; 2 Dangerous; 3 Very dangerous

Organization issuing the statement: Republic Hydrometeorological Service of Serbia

Issued/Amended/Cancelled: 28-08-2012, 12.00 p.m.

Contact: E-mail: xy@hidmet.gov.rs; Phone: +3811XXXXXXX; Fax: +3811XXXXXXX

Valid from – to: 27-08-2012 – 10-09-2012 Next amendment: 04-09-2012

Region of concern: Western Balkans

Drought Monitoring for August 2012

In the period from 19th to 25th August dry and warm weather prevailed in the region of western Balkans.

Mean temperature anomaly was above normal (1981-2010) from +3°C to +7°C. A heat wave with maximum temperature of up to 41°C was recorded in Serbia.

There was no significant precipitation in most of the region.

According to the standardized precipitation index SPI - 1[1], severe to exceptional drought prevailed in most of Serbia, and according to the standardized precipitation index SPI-2[2], severe to extreme drought prevailed in most of the region, with the exception of the eastern and southern parts of the country where normal humidity conditions were recorded.

During the observed period, water levels on the rivers in Serbia were within the range of low and medium low values. Water temperature was above the average values for August. On smaller streams, flows were close to the values of the biological minimum[3].

Fires were recorded at many locations in the region (Macedonia, Montenegro, Bosnia and Herzegovina, Albania, Croatia and Serbia).

Weather Prediction

Within the next two weeks, warmer and drought ier than normal (1981-2010) conditions are expected. Mean air temperature will be above normal and the probability of this anomaly is estimated at about 60%. The expected temperature anomaly ranges from +0.5°C to +1°C in the Western Balkans. During this period a rainfall deficit is expected to occur and the probability of this anomaly is estimated at about 60%.

According to the forecast, from 27th August to 23rd September weather is expected to be slightly warmer and normal to drought y compared to normal (1981-2010). Mean temperature will be above normal and the probability of this anomaly is estimated at about 70%. The expected temperature anomaly will be about +1°C. Also, in the entire region, weather is expected to be normal to drought y, and the probability of this anomaly is estimated at about 60%.

According to the forecasted values of SPI-2, moderate to severe drought will prevail in most parts of Serbia until 23rd September, while normal humidity conditions are expected in the southern parts of the country.

Dry weather is expected during the autumn season (September, October and November), with temperature around normal, except in the Adriatic, where more precipitation is expected to occur.

Impact – Conclusion

An updated statement will be published on 04-09-2012.

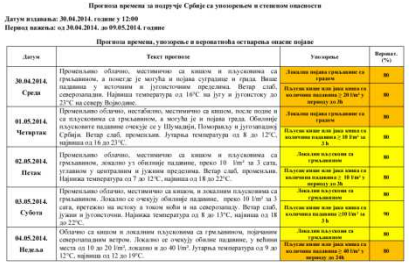
APPENDIX

Figure 1. Moisture conditions in Serbia, based on the Standardized Precipitation Index (SPI-1) for the 30-day period (28. 07 – 26. 08. 2012)

Figure 2. Forecast of the Standardised Precipitation Index (SPI-2) for the 60-day period, produced on the basis of the observed and forecasted monthly precipitation (27. 08 – 25. 09. 2012) ECMWF and SEEVCCC

Daily forecast outputs for decision makers Operational bulletin - Example

- **Meteorological data from main meteorological stations**
- **Weather forecast and alerts for five days ahead and general forecast for ten days ahead.**
- **Monthly weather forecast**
- **Seasonal weather forecast**
- **Observed hydrological data**
- **Hydrological forecast and warnings**



Прогноза времена за подручје Србије са упозорењем и ставном опасности

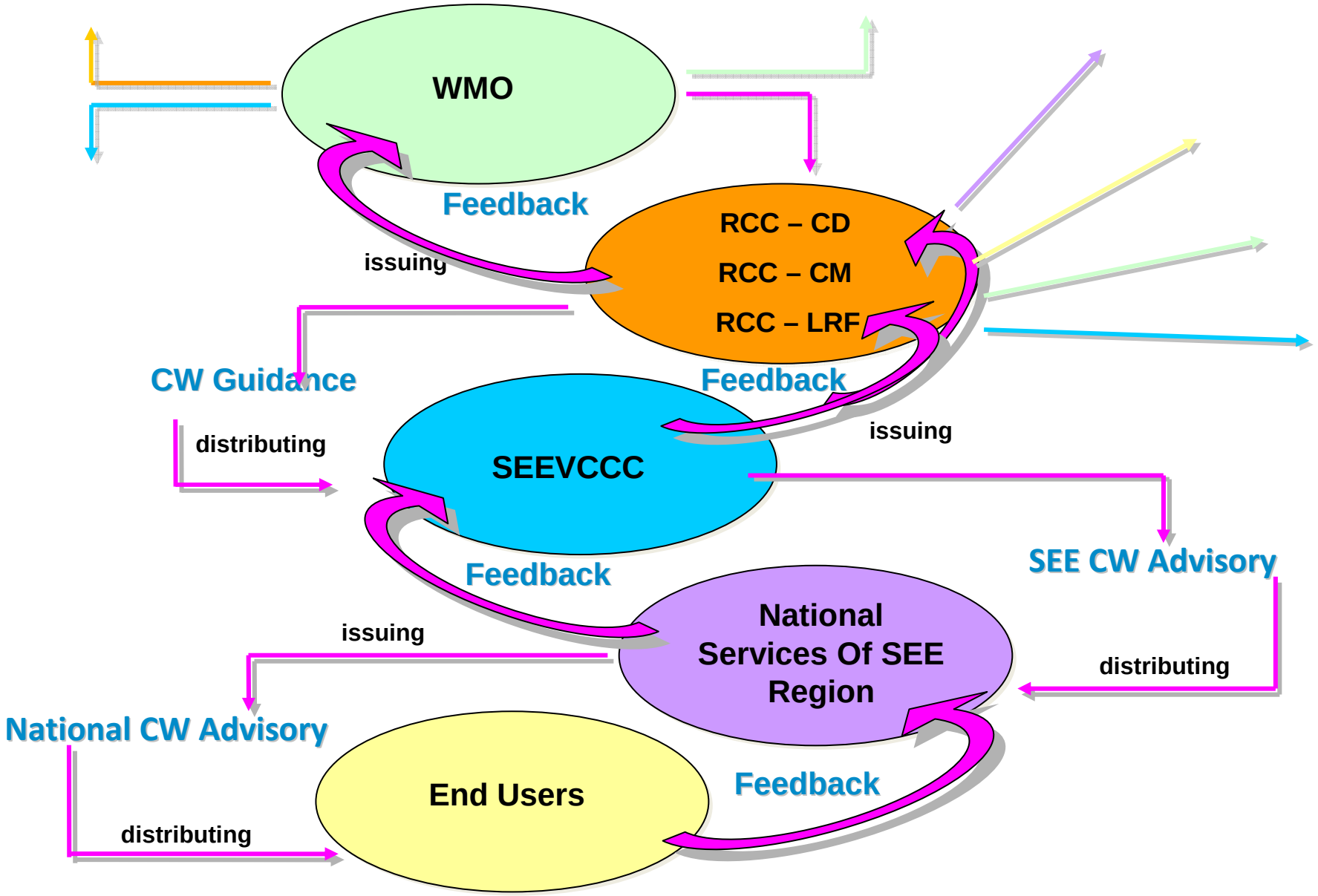
Датум издавања: 30.04.2014. године у 12:00

Период важења: од 30.04.2014. до 09.05.2014. године

Прогноза времена, упозорење и вероватноћа остварења опасне појаве

Датум	Текст прогнозе	Упозорење	Вероват. (%)
30.04.2014. Среда	Претежно облачно, местимично са кишом и пљусковима са грмљавином, а повеја је могућа и градом. Веће падавине у источним и југоисточним пределима. Ветар слаб, северозападни. Највиша температура од 16°С на југу и југоистоку до 23°С на северу Војводине.	Локални порои грмљавине са градом	80
01.05.2014. Четвртак	Претежно облачно, местимично са кишом, после подне и са пљусковима са грмљавином, а могућа је и појава града. Обилније пљусковите падавине очекује се у Шумадији. Повремено у југозападној Србији. Ветар слаб, промењљив. Јутарња температура од 8 до 12°С, највиша од 16 до 23°С.	Локални порои грмљавине са градом Појава јаких киша (киша која изазива количину падавина ≥ 10 l/m² за 3 h)	80 80
02.05.2014. Петак	Претежно облачно, местимично са кишом и пљусковима са грмљавином, локално уз обилније падавине, преко 10 l/m² за 3 сата, углавном у централним и јужним пределима. Ветар слаб, промењљив. Најнижа температура од 7 до 12°С, највиша од 18 до 22°С.	Локални пљускови са грмљавином Појава јаких киша (киша која изазива количину падавина ≥ 10 l/m² за 3 h)	80 80
03.05.2014. Субота	Претежно облачно, местимично са кишом, и локалним пљусковима са грмљавином. Локално се очекују обилније падавине, преко 10 l/m² за 3 сата, претежно на истоку и током ноћи и на северозападу. Ветар слаб, променљив и југоисточни. Најнижа температура од 8 до 13°С, највиша од 18 до 22°С.	Локални пљускови са грмљавином Појава јаких киша (киша која изазива количину падавина ≥10 l/m² за 3 h	80 90
04.05.2014. Недеља	Облачно са кишом и локалним пљусковима са грмљавином, појачани северозападним ветром. Локално се очекују обилне падавине, у већини места од 10 до 20 l/m², локално и до 40 l/m². Јутарња температура од 9 до 12°С, највиша од 12 до 19°С.	Локални пљускови са грмљавином Појава јаких киша (киша која изазива количину падавина ≥ 40 l/m² за 3 h)	80 80

Climate Watch System



WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS

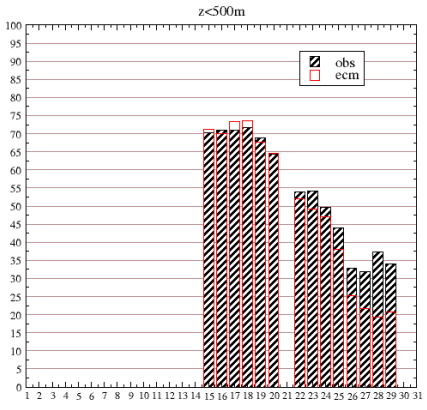
Future Plans and R&D activities 1/2

Improvement technical and human resources as support to development operational and highly recommended functions :

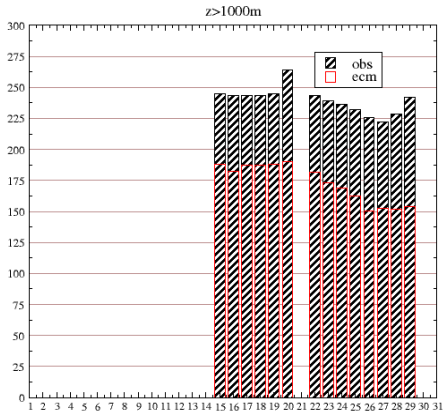
- Supercomputer for better resolution, hindcast
- Better exchange data for improving regional data assimilation or additional measurements during severe weather situations – better risk assessment (Example: snow water content during winter 2012 extra ordinary situations over SEE)
- Training
- Coupling with ocean, aerosols (DREAM), hydrology (HYPROM)
- Testing model on regional and local scales
- Project activities : SEERISK, ORIENGATE,

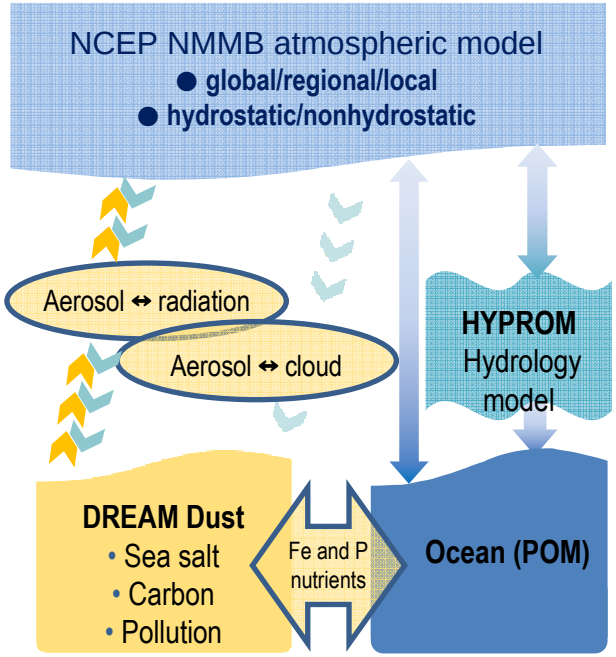
ECMWF snow water eq. VS obs Feb 2012

At stations bellow 500m



At stations above 1000m





WMO RA VI-Europe RCC Network – SEEVCCC/RHMSS

Future Plans and R&D activities 2/2

- Implementation of mandatory functions within WMO RA VI RCC-Network,
- Climate Change Adaptation and Disaster Reduction;

- Implementation of RCC highly recommended functions trough
- Implementation of Long Term Research and Development Plan 2012-2016
- adopted by Expert SEE – Meeting and Ministerial conference “Climate
- Research Aimed at Environmental Protection, Climate Change Adaptation
- and Disaster Reduction”, held on 13th April 2011 in Belgrade;

- Collaboration in further application and improvement of Climate Watch
- Advisory System;

- Enhancing of sub-regional cooperation and partnerships;

- Contribution to GFCS, WCRP, IPCC, UNFCCC, WMO/RCOF-SEECOF,
- WMO/WIS …

THANK YOU FOR YOUR ATTENTION

www.seevccc.rs

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