Climate monitoring, data exchange and data policy

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WMO RA VI-Europe RCC Network SEEVCCC pre-operational functions:

- **Climate Data Node**

  Lead: KNMI/Netherlands (consortium member SEEVCCC/RHMS-Serbia)
  South East European gridded model datasets for 1961-1990 (ready)

- **Climate Monitoring Node**

  Lead: DWD/Germany (participate SEEVCCC/RHMS-Serbia)

  • collecting data from the stations (monthly, 400-500 stations; main source for data KNMI-ECA&D, other climate bulletins NCDC)
  • mean temperature and accumulated precipitation,
  • temperature anomaly and precipitation percent of normal,
  • all available monthly/three-monthly

- **Long Range Forecast Node**

  Lead: Météo-France & ROSHYDROMET (participate SEEVCCC/RHMS-Serbia)
  Once a month ensemble run of a regional long range forecast - 7 months ahead:
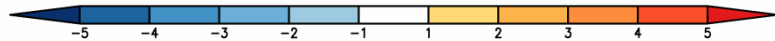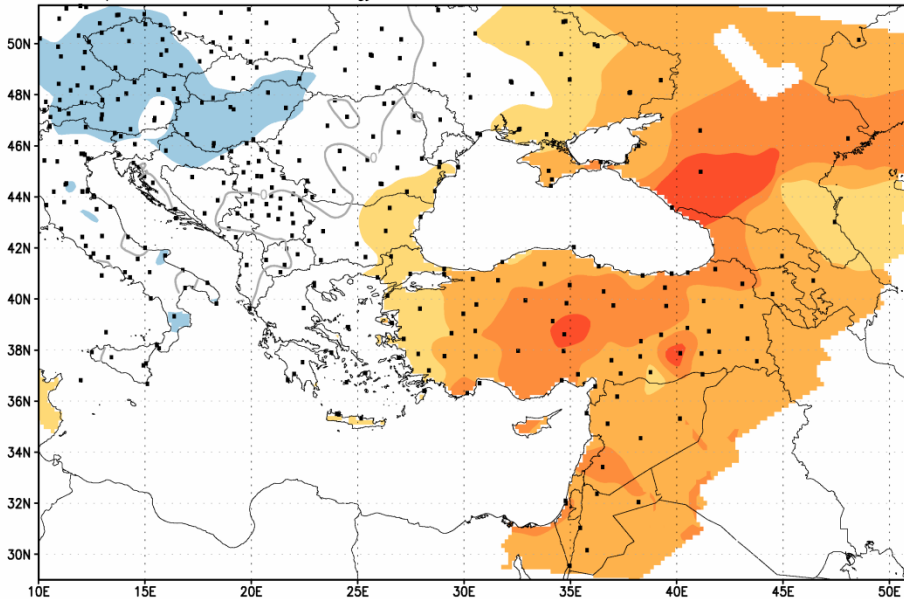 dynamical downscaling ECMWF 41 ensemble with RCM-SEEVCCC

Climate Monitoring Node

- Climate Watch Advisory for SEE -

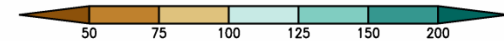### • Example of the product : September 2010

Temperature anomaly

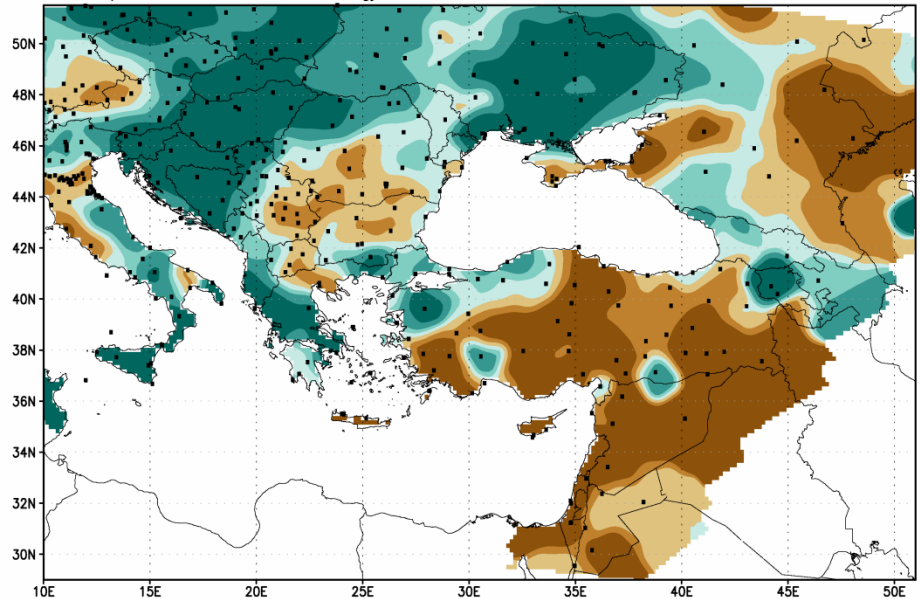**Precipitation (percent of normal)**

Climate monitoring: Temperature anomaly (°C) for SEP 2010 with respect to 1961-1990 climatology

Climate monitoring: Precipitation (percent of normal) for SEP 2010 with respect to 1961-1990 climatology
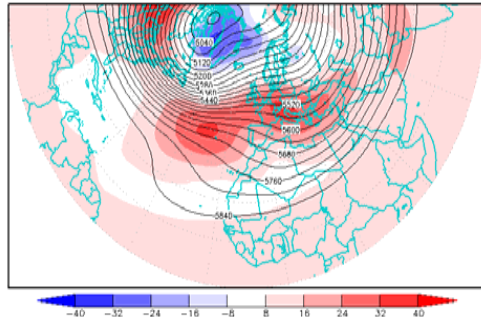
• **available maps:**
   for each month and for 3 months:
   • mean 2m temperature, acc. precipitation,
   • temperature anomaly, precipitation percent of normal (with respect to 1961-1990)
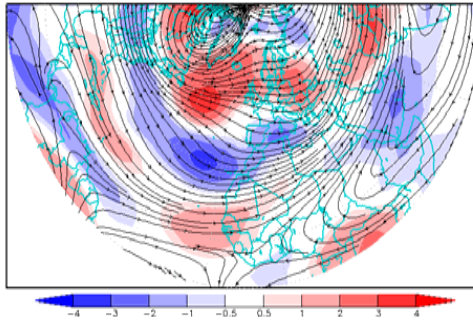
Global Reanalysis

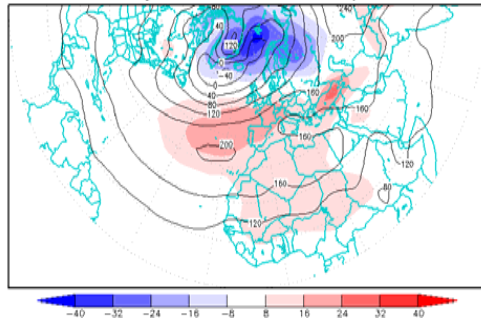NOAA (sst,olr) and NCEP/NCAR (T,hgt,wind) Reanalysis

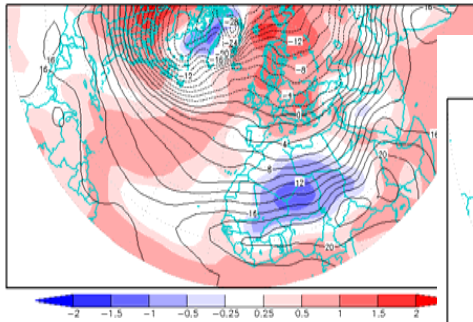Jan AT500 hgt 1981−2010 and anomaly 1961−1990

Jan_AT200 wind 1981−2010 and anomaly 1961−1990

Jan AT1000 hgt 1981−2010 and anomaly 1961−1990
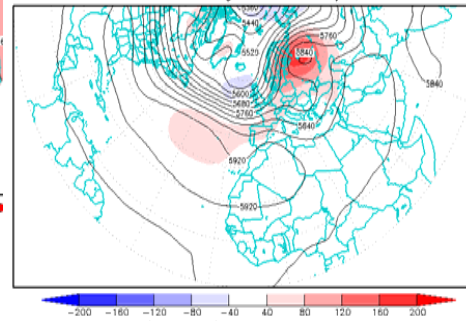

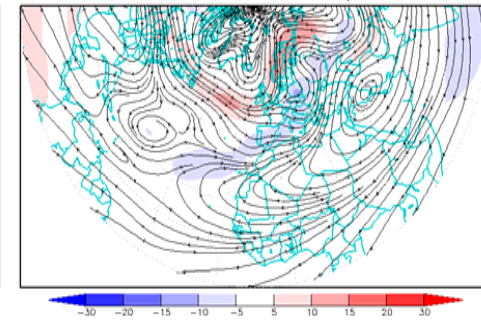Jan AT850 T 1981−2010 and anomaly 1961−1990

Referent periods:

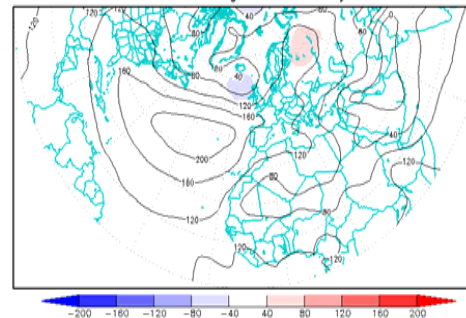- 1961 - 1990
- 1971 - 2000
- 1981 - 2010

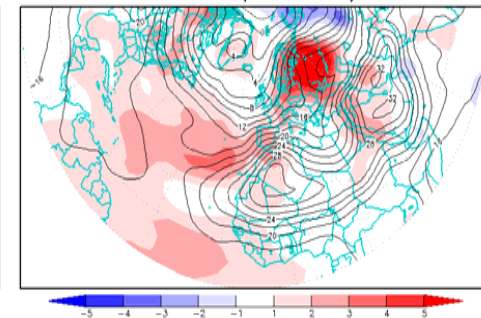Jul2010 AT500 hgt and anomaly 61−90

Jul2010 AT200 wind and anomaly 61−90

Jul2010 AT1000 hgt and anomaly 61−90

Jul2010 AT850 Temp and anomaly 61−90

Fires in Russia →

- Climate Data

Meteorological Observing System

- **Synoptic**   **32**   **hourly observation**

  Principal Climatological Agrometeorlogical Stations (in paralel 28 AWS)

- Ordinary Climatological stations   97   3 times per day

- Precipitation stations   558   daily measurements

- Air quality stations   26

- Ordinary Agrometeorological stations   35

- Phenological stations   52

- Upper air observations   1

- Meteorological Radar Centres   1+13

NACIONALNA MREŽA SINOPTIČKIH STANICA

LEGENDA:
- PRIZEMNA SINOPTIČKA STANICA
- GAW / EMEP STANICA
- VISINSKA SINOPTIČKA STANICA

■ Climate Monitoring

The analysis of climate elements and their anomalies in relation to multi-annual mean values

• RHMSS Weekly bulletin
• RHMSS Monthly bulletin
• RHMSS Annual bulletin

Selected parts of RHMSS Annual bulletin is regularly submitted to DWD Annual Bulletin on Climate in WMO Region VI

RHMSS Report on extreme climate events
Contains registered extreme annual climate events published quarterly, annually, and upon occurrence of extreme event.
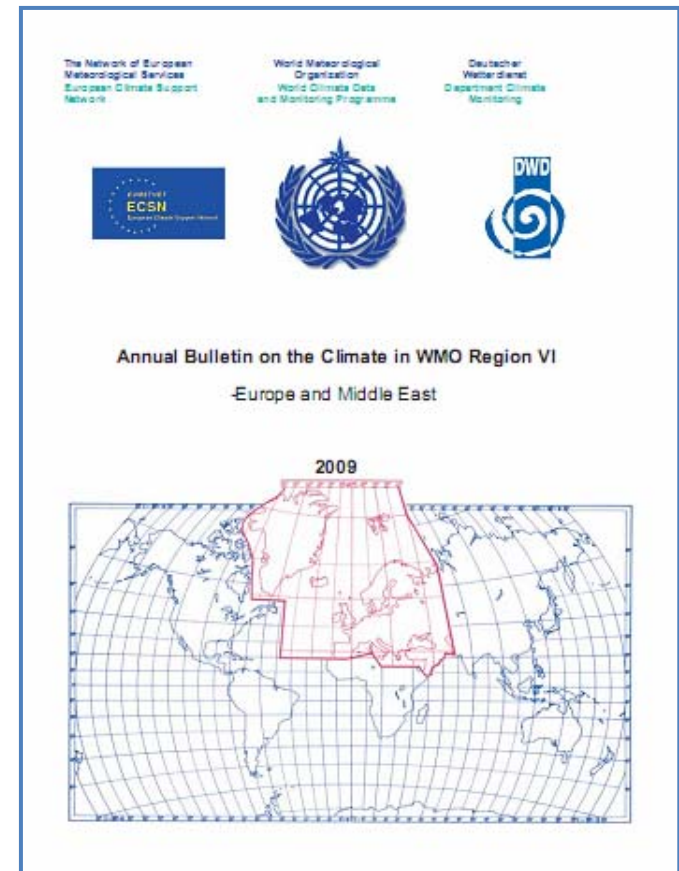
■ RHMSS Climate related activities and products

(ongoing and/or completed activities)
- Update of climate maps
- Trend analysis of observed climate change
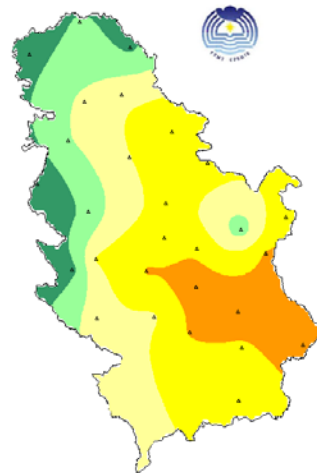- Statistical analysis of extremes
--Climate services for users

These products are available on RHMSS web-site www.hidmet.gov.rs
Monthly temperature and precipitation and their anomalies are regularly submitted to of
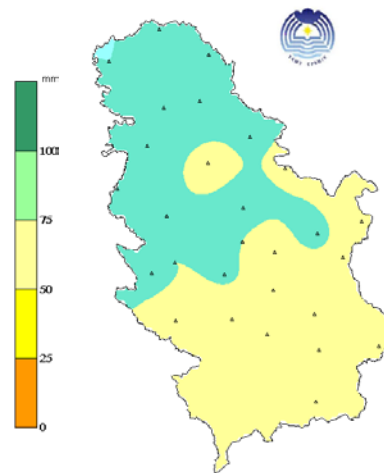DWD – ECSM (European Climate System Monitoring).

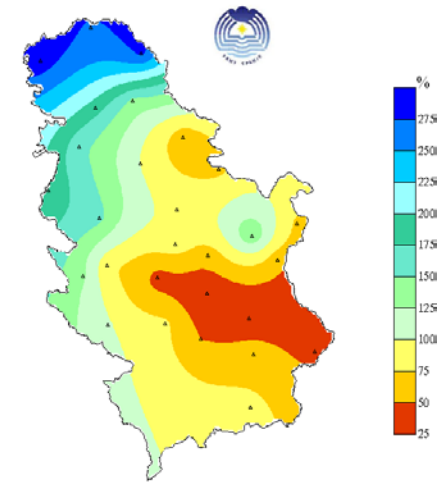Temperature September 2010.
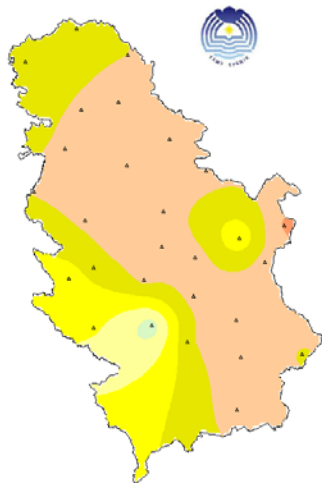
Precipitation September 2010.

September 2010.
Surface temperature anomalies
(Reference period 1961-1990.)

September 2010.
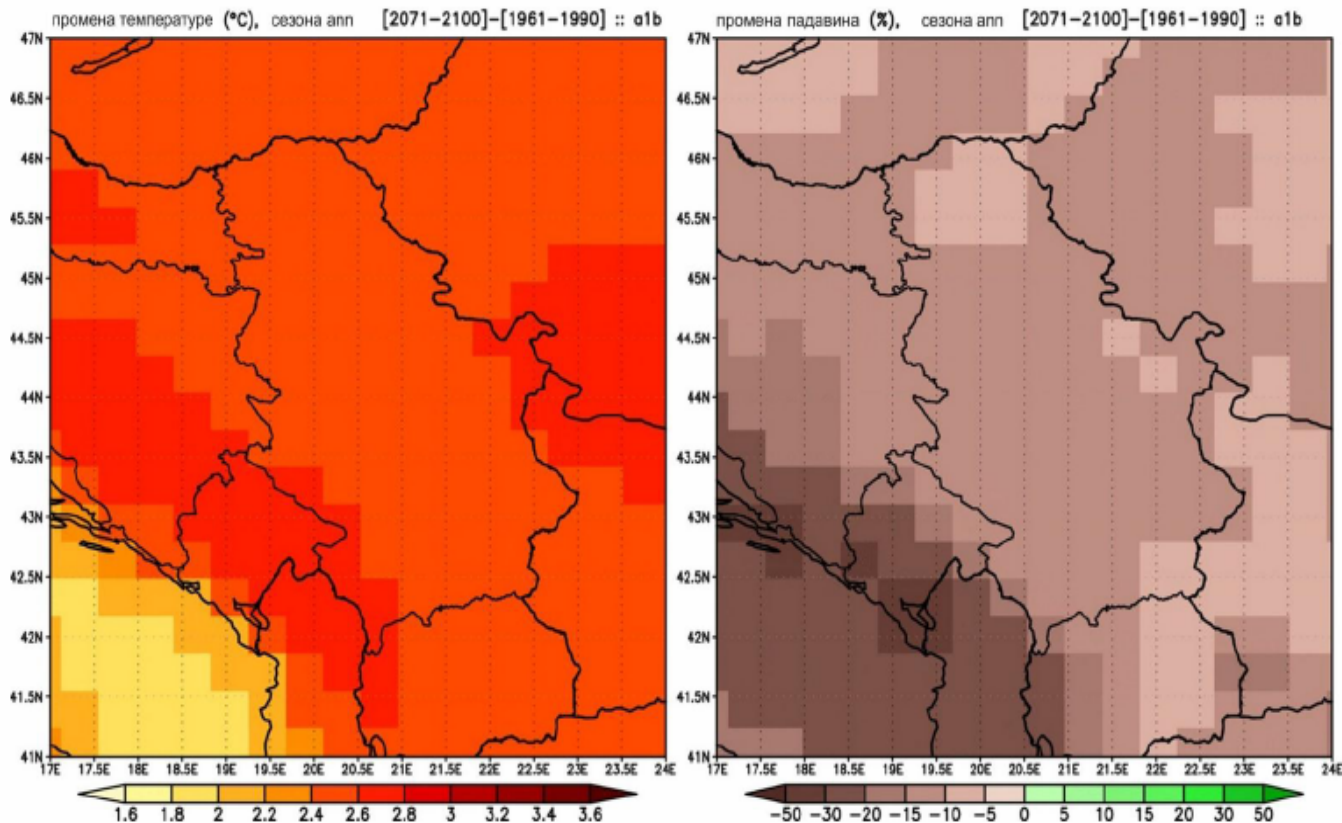Precipitation in percent of normal
(Reference period 1961-1990.)

Climate change research to support adaptation

-Climate projections developed for the period 2001-2030 and 2070-2100 using RCM-SEEVCCC and IPCC/SRES A1B and A2 scenarios-
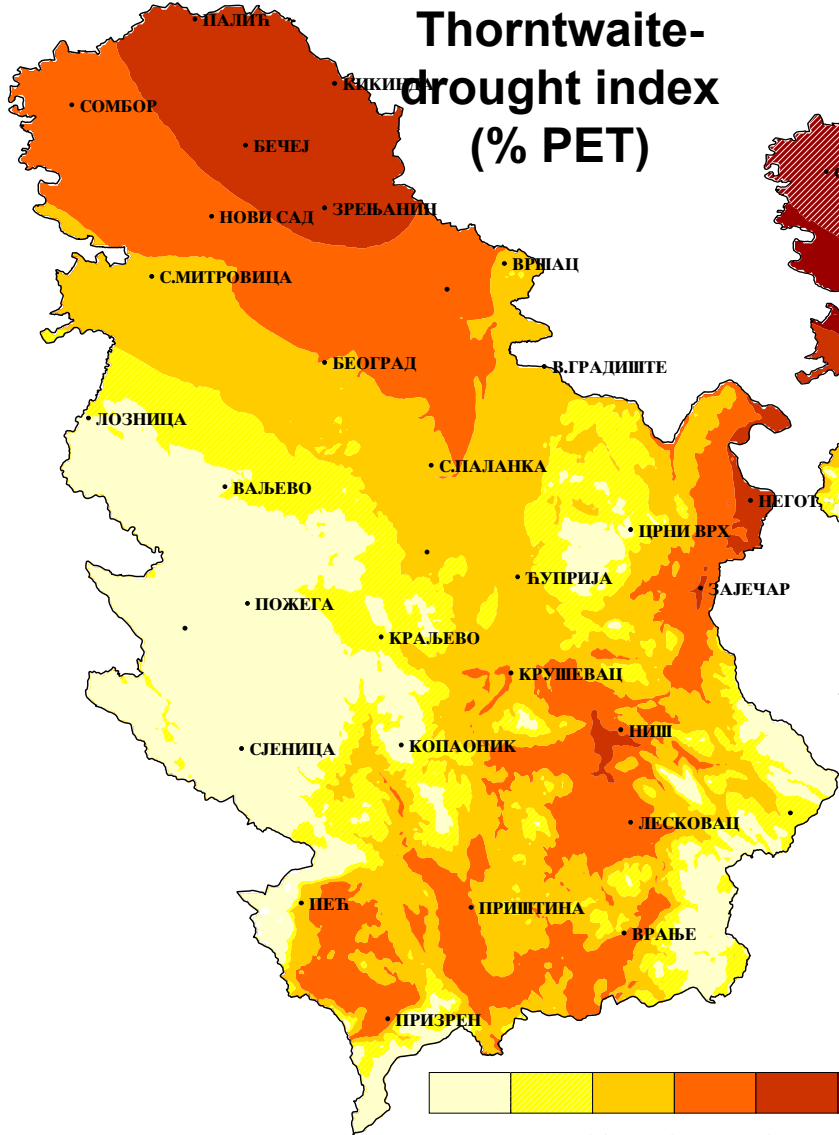

A1B scenario, 2070-2100: Temperature and precipitation changes over the territory of Serbia
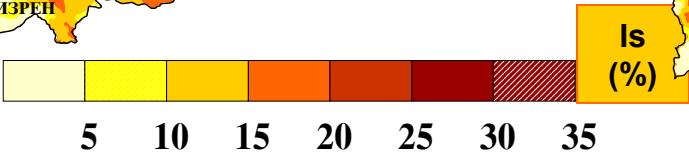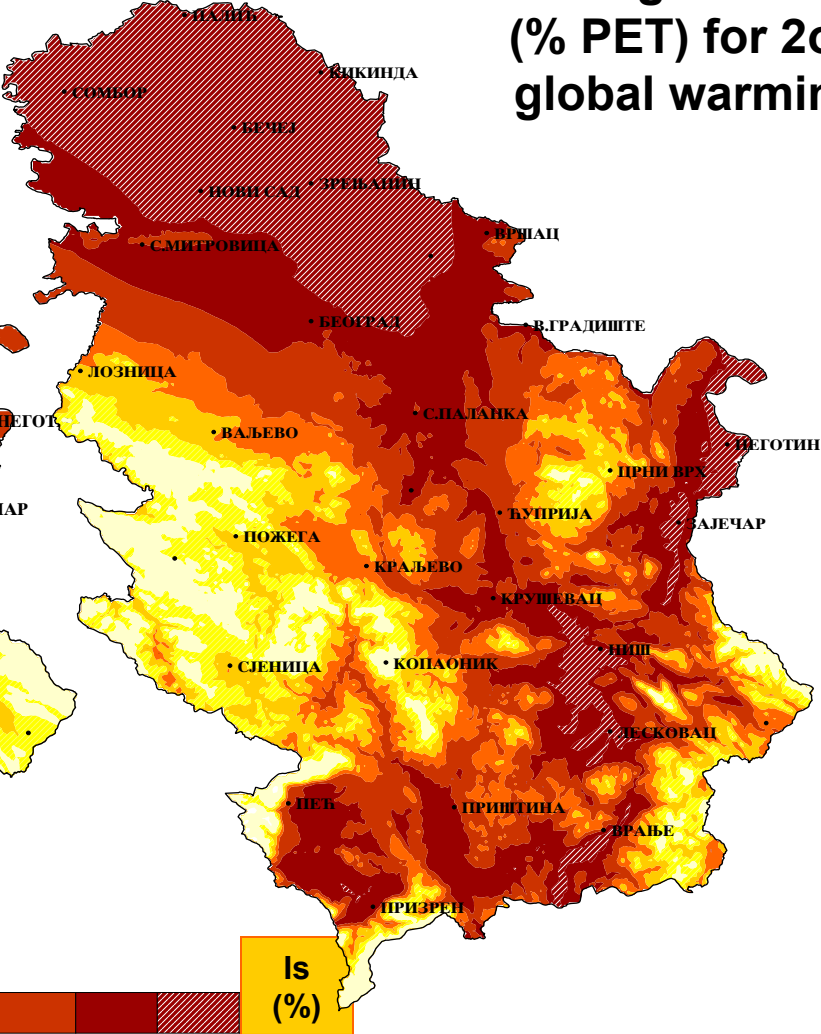
Annual Temperature (0C): 2.4-2.8; Annual precipitation (%):-15 - 0

Climate change research to support adaptation in agriculture sector

Thorntwaite-drought index (% PET)

Thorntwaite-drought index (% PET) for 2oC global warming

Is (%)

5 10 15 20 25 30 35

▪ Long Range Forecast

Analogy method: Recognizes in statistical sense earlier system that is
similar to the existing one to be forecasted;
• monthly forecast (on 1st and 15th in the month)

Interpretation of   Use of information from different sources – forecast in text form
GPC forecasts: •7 months forecast (once a month)

CPT: Preparation for operational use

new

Ensemble seasonal forecast:

SEEVCCC LRF products available every month for 7 months ahead.
Dynamical downscaling of ECMWF 41 ensemble with RCM-SEEVCCC
fully coupled atmospheric-ocean-land model.

Operational available products are:
• mean ensemble maps (mean 2m temperature, precipitation accumulation,
temperature anomaly and precipitation anomaly with respect to CRU data 1961-1990)
for month and three months (season)
• diagrams (probabilistic forecast of mean monthly temperature and
monthly precipitation accumulation for specific place)

Model climatology runs are in pipeline subject to improvement in HPC capabilites,
Therefore BIAS correction methodology is applied on some products.

CLIMATE WATCH – EARLY WARNING OF TEMPERATURE ANOMALIES AND EXTREMES

Example: Positive June 2010 temperature anomaly forecasted in March 2010 is used for initial climate watch advisory for heat wave – SEEVCCC LRF forecast start: March 1st 2010
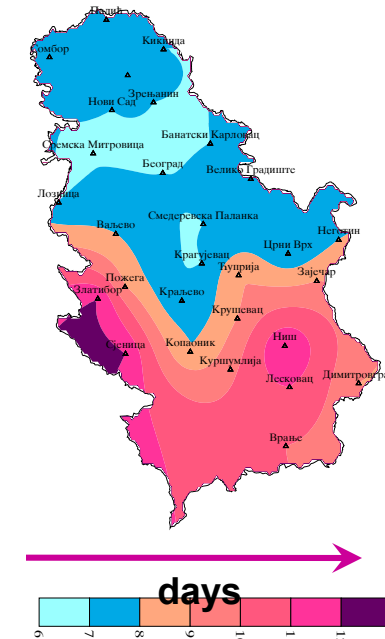
Map of temperature anomaly for June 2010
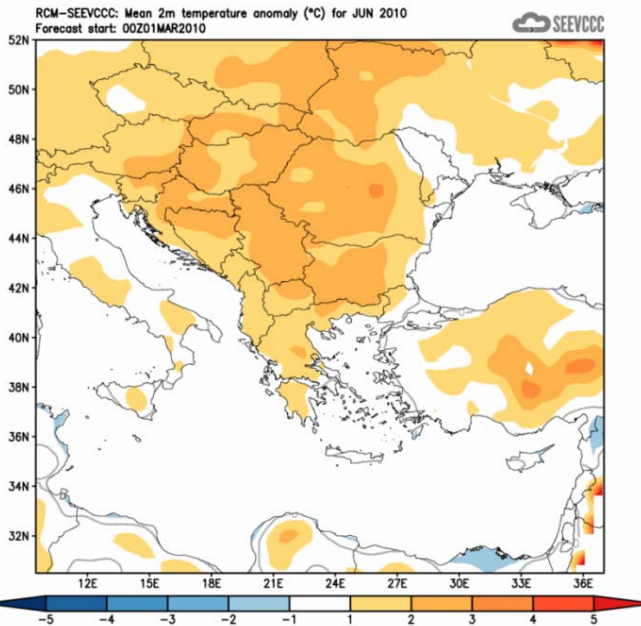
Probabilistic diagram for monthly temperature Belgrade (LRF, normal 1961/90, observations)
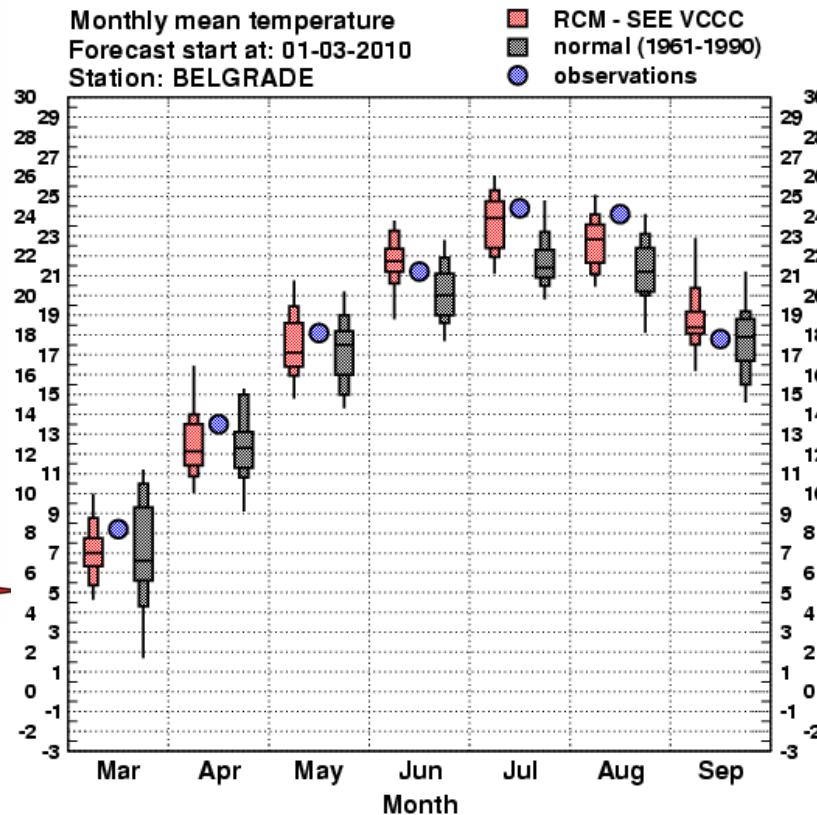
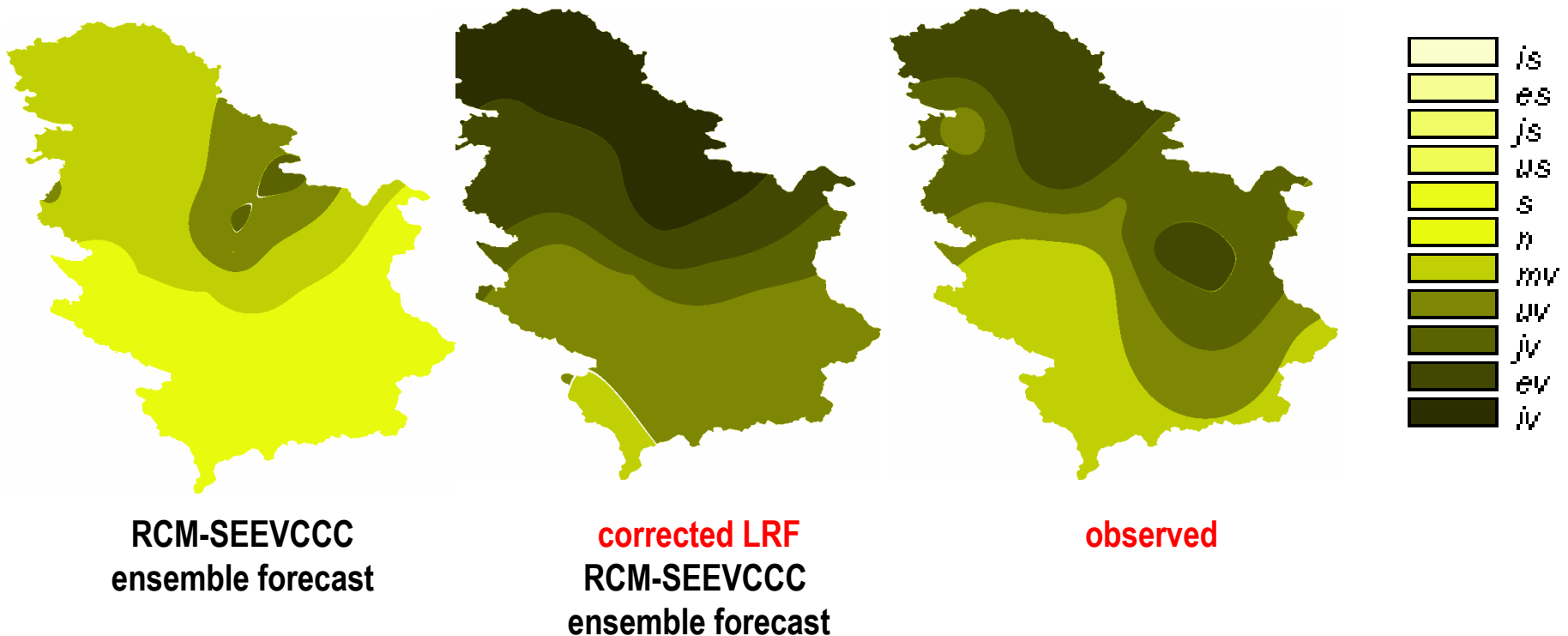**Observed heat wave for June 2010**

Simple BIAS correction applied on temperature: 0.5C decrease on every100m altitude above 200m.

CLIMATE WATCH – EARLY WARNING OF PRECIPITATION ANOMALIES AND EXTREMES

Example: <u>Extremely wet **SPI2** for February 2010 –</u> LRF forecast start: January 1st 2010

New! Under development

RCM-SEEVCCC
ensemble forecast

corrected LRF
RCM-SEEVCCC
ensemble forecast

observed

Legend (top to bottom): is, es, js, us, s, n, mv, uv, jv, ev, iv

Instead of canceling the model climate drift when comparing to model climatology, as a first aid a method of <u>Statistical BIAS correction (based on daily climatology)</u> is developed for this purpose and applied on ensemble SEEVCCC LRF.

Republic
Hydrometeorological
Service of Serbia
(establishted 1888,
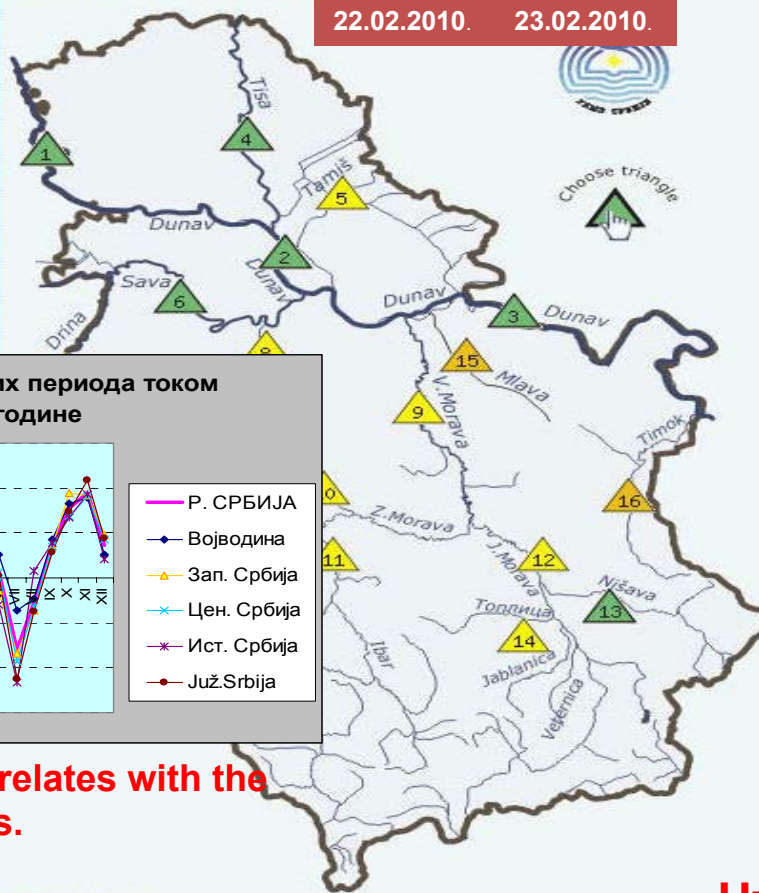WMO member since 1947)

Hydro alarm

Hydrological forecast
+381 11 3050 904
srhydra@hidmet.gov.rs

Republic of Serbia

Ћирилица   Latinica

Alarm homepage
Meteoalarm
Hydroalarm
FWI
FWI - forecast
Radar images
LAWR - Belgrade
UV index forecast
Heat / cold wave
Feedback
Documentation

Hydro alarm - forecast for date: 24.10.2010.

Choose date: Actual   24.10.2010.   25.1   **21.02.2010**.
22.02.2010.   **23.02.2010**.

Choose triangle

River (river section)	Alarm rank
1. Dunav do Novog Sada	🔺
2. Dunav od Novog Sada do Smedereva	🔺
3. Dunav nizvodno od Smedereva	🔺
4. Tisa	🔺
5. Tamiš i banatski vodotoci	⬆️ 🔺
6. Sava	🔺
7. Drina	⬆️ 🔺
8. Kolubara sa pritokama	⬆️ 🔺
9. Velika Morava	⬆️ 🔺
10. Zapadna Morava	⬆️ 🔺
11. Ibar	⬆️ 🔺
12. Južna Morava	⬆️ 🔺
13. Nišava	🔺
14. Toplica, Jablanica i Veternica	⬆️ 🔺
15. Mlava	⬆️ 🔺
16. Timok	⬆️ 🔺

Choose the river name (river section) for more information.

Legend:

⬆️ Water stage rise   🧊 Ice
⬇️ Water stage fall   🚢 Navigation

Појава сушних и влажних периода током 2006. и 2007. године

СПИ-2

— Р. СРБИЈА
— Војводина
— Зап. Србија
— Цен. Србија
— Ист. Србија
— Јуж.Srbija

SPI2,3.. are also correlates with the occurrence of floods.

Alarm rank:

🔺 - No warning.

🔺 - Significant water stage rise or fall. Ice in movement covers 10% to 40% of water surface. Events that could require undertaking of measures for **first flood or ice alert.**

🔺 - Very significant water stage rise or fall. Ice in movement covers 50% to 100% (immovable ice) of water surface. Events that could require undertaking of measures for **seconf flood or ice alert.**

🔺 - Extreme hydrological events and conditions.

Hydro alarm – operational at the RHMSS as of 2007.

End users on national level

Climate monitoring, LRF and Climate watch advisory are sent to ministries and other institutions from the following sector: disaster risk management, energy, environment, agriculture, forestry, Health, insurance, district heating companies, road authorities, media, etc.

Monthly and annual bulletins are available on web-site of RHMSS www.hidmet.gov.rs

Future plans

1. Improvement of Long Range Forecasting introducing the model climatology
2. Introducing and adapting climate watch – early warning system to end users (sector of agriculture, energy, water management,..)
3. Assessment and mapping of climate hazard, vulnerability, and risk
4. To develop ensemble monthly forecast, as dynamical downscaling of ECMWF ensemble monthly forecast on higher resolution in order to have more precise tool for early warning system as expected event approaches in time (depend on available CPU time)
5. Improve verification of LRF system
6. Enhancing regional cooperation within WMO Programmes and RA VI RCC Network, SEEVCCC, DMCSEE, WMO/UNDP DRR SEE Regional Project, SEE Action plan for adaptation and other initiatives to support data exchange, climate research, training and capacity building

THANK YOU!