Verification of operational seasonal forecasts at RA-VI Regional Climate Center South East European Virtual Climate Change Centre

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WMO RA VI-EUROPE RCC NETWORK SEEVCCC MANDATORY OPERATIONAL FUNCTIONS:

- **Climate Data Node**
- **Lead: KNMI/Netherlands (consortium member SEEVCCC/RHMS-Serbia)**
- South East European gridded model datasets for
  1961-1990, 2001-2030, 2071-2100 first version RCM-SEEVCCC (ready)
  1971-2000, 2071-2100 new RCM-SEEVCCC (in progress, NMMB)

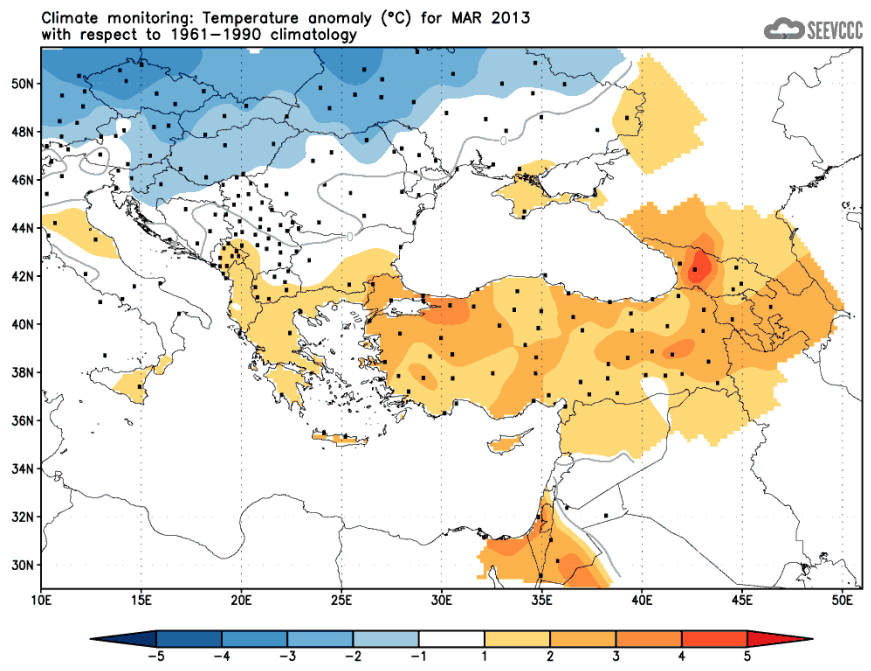
- **Climate Monitoring Node**
- **Lead: DWD/Germany (participate SEEVCCC/RHMS-Serbia)**
- Collecting data from stations (monthly, 400-500 stations)
- Main source for data KNMI-ECA&D, other climate bulletins NCDC
- Mean temperature and accumulated precipitation,
- Temperature anomaly and precipitation 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 51 ensemble with RCM-SEEVCCC

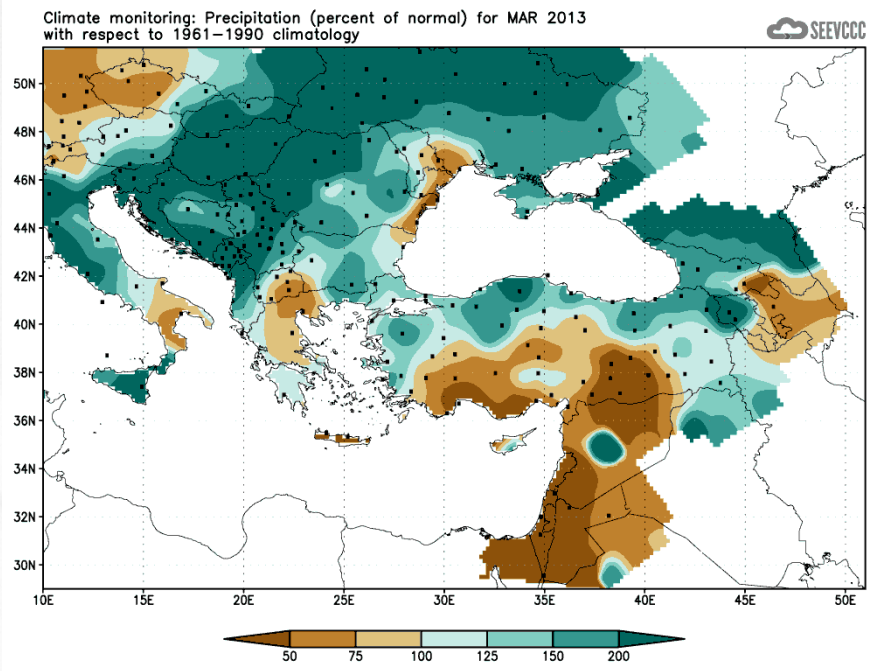
Climate monitoring node

Climate Watch advisory for SEE

Temperature anomaly



Precipitation (percent of normal)



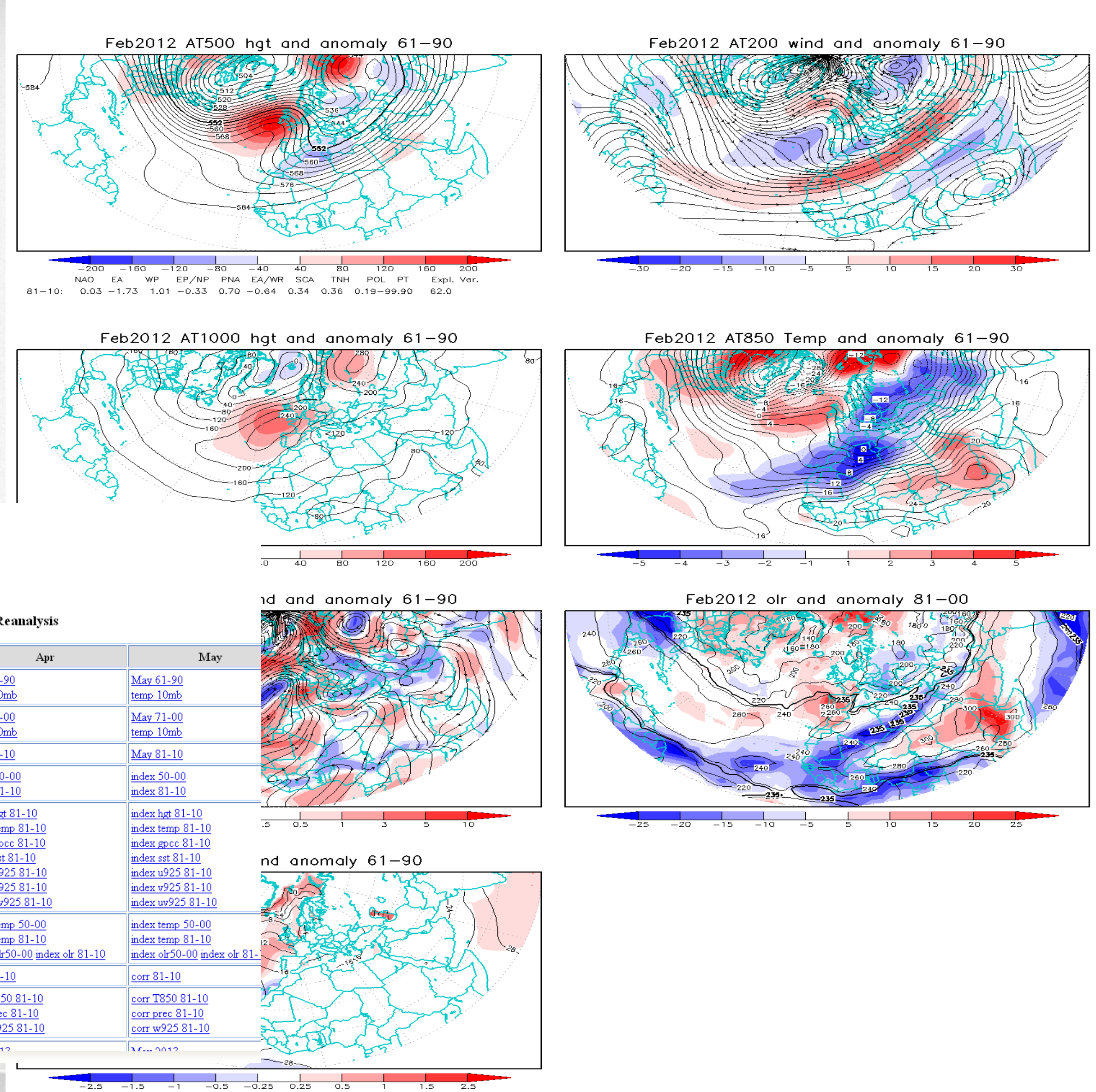
- **available maps:** for each month and for next 3 months:
  - mean 2m temperature, acc. precipitation,
  - temperature anomaly, precipitation percent of normal (with respect to 1961-1990)

Monitoring – NCAR/NCEP reanalysis

- **Daily and monthly available**

  Available at the beginning of the month

Z500; u,v200; T850; SST; olr…



SEE VCCC

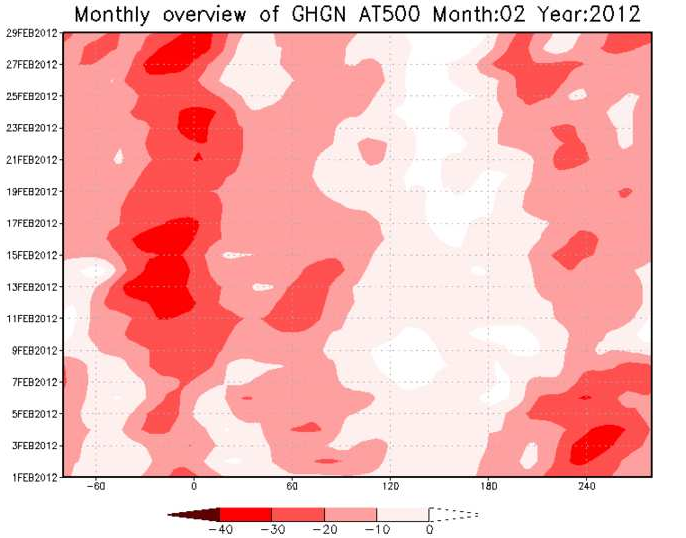
NOAA(sst,olr) and NCEP/NCAR(T,hgt,wind)Reanalysis

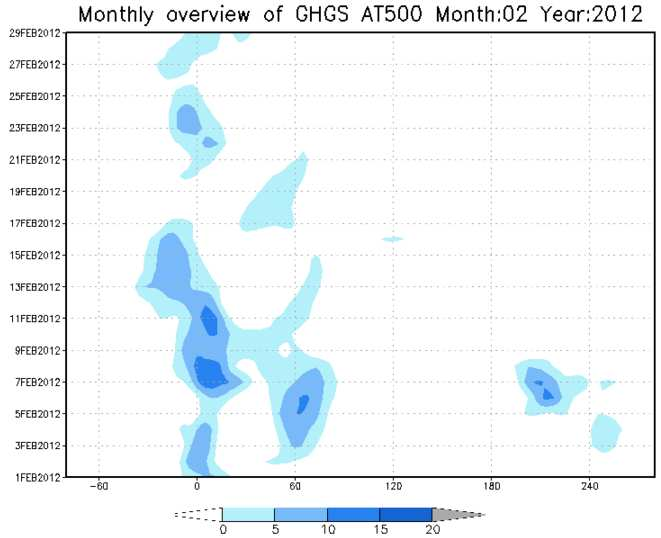
seevccc	Jan	Feb	Mar	Apr	May
1961-1990	Jan 61-90 temp 10mb	Feb 61-90 temp 10mb	Mar 61-90 temp 10mb	Apr 61-90 temp 10mb	May 61-90 temp 10mb
1971-2000	Jan 71-00 temp 10mb	Feb 71-00 temp 10mb	Mar 71-00 temp 10mb	Apr 71-00 temp 10mb	May 71-00 temp 10mb
1981-2010	Jan 81-10	Feb 81-10	Mar 81-10	Apr 81-10	May 81-10
indices	index 50-00 index 81-10	index 50-00 index 81-10	index 50-00 index 81-10	index 50-00 index 81-10	index 50-00 index 81-10
indices2 phase	index hgt 81-10 index temp 81-10 index gpcc 81-10 index sst 81-10 index u925 81-10 index v925 81-10 index uv925 81-10	index hgt 81-10 index temp 81-10 index gpcc 81-10 index sst 81-10 index u925 81-10 index v925 81-10 index uv925 81-10	index hgt 81-10 index temp 81-10 index gpcc 81-10 index sst 81-10 index u925 81-10 index v925 81-10 index uv925 81-10	index hgt 81-10 index temp 81-10 index gpcc 81-10 index sst 81-10 index u925 81-10 index v925 81-10 index uv925 81-10	index hgt 81-10 index temp 81-10 index gpcc 81-10 index sst 81-10 index u925 81-10 index v925 81-10 index uv925 81-10
extreme indices	index temp 50-00 index temp 81-10 index olr50-00 index olr 81-10	index temp 50-00 index temp 81-10 index olr50-00 index olr 81-10	index temp 50-00 index temp 81-10 index olr50-00 index olr 81-10	index temp 50-00 index temp 81-10 index olr50-00 index olr 81-10	index temp 50-00 index temp 81-10 index olr50-00 index olr 81-
indices5-corr	corr 81-10	corr 81-10	corr 81-10	corr 81-10	corr 81-10
indices7-corr	corr T850 81-10 corr prec 81-10 corr w925 81-10	corr T850 81-10 corr prec 81-10 corr w925 81-10	corr T850 81-10 corr prec 81-10 corr w925 81-10	corr T850 81-10 corr prec 81-10 corr w925 81-10	corr T850 81-10 corr prec 81-10 corr w925 81-10

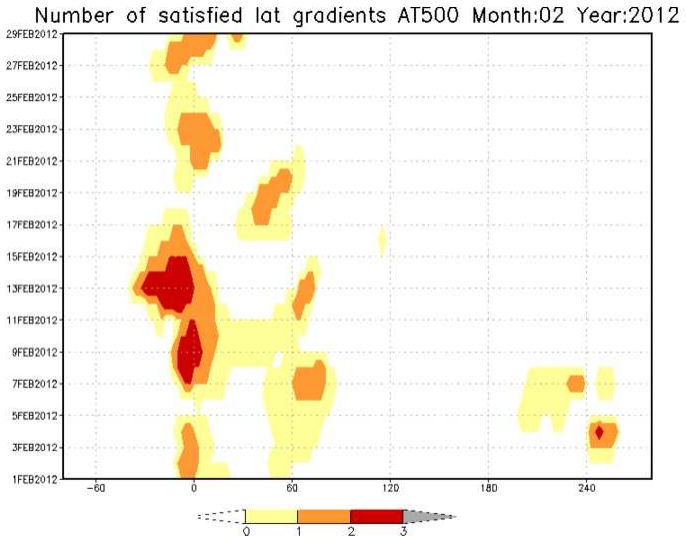
www.seevccc.rs/IDX/imgsrc/Aprindex2.png

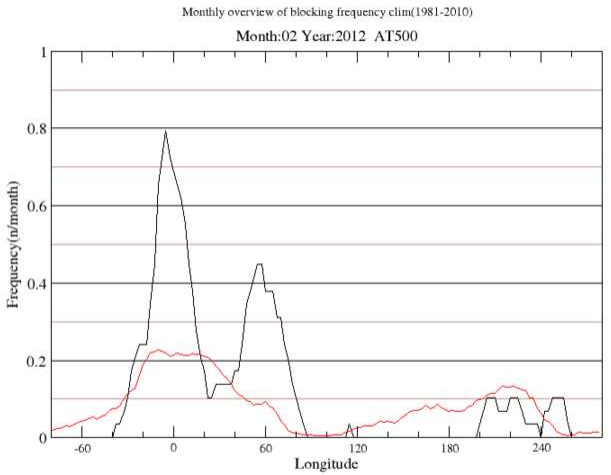
Monitoring – blocking (Tibaldi & Molteni, 1990)

Daily data









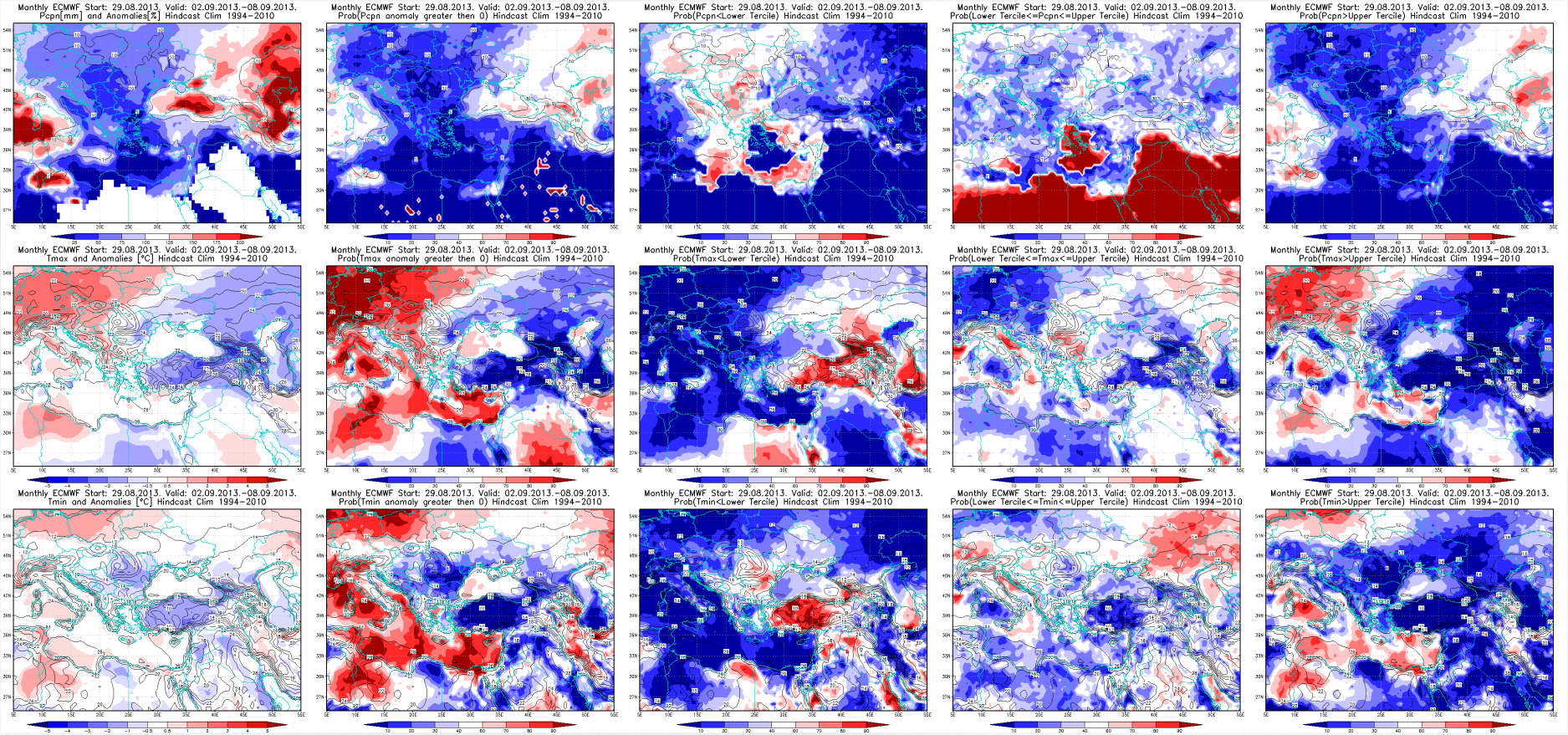
Monthly data + climatology (in red)

Monthly forecast - ECMWF

Weekly / monthly basis – Tmin, Tmax, precipitation

Probabilistic forecast – teciles and median

Model climatology – 1994 – 2011; 5 ensemble members



Forecast issued 29.08.2013.; valid 02-08.09.2013.

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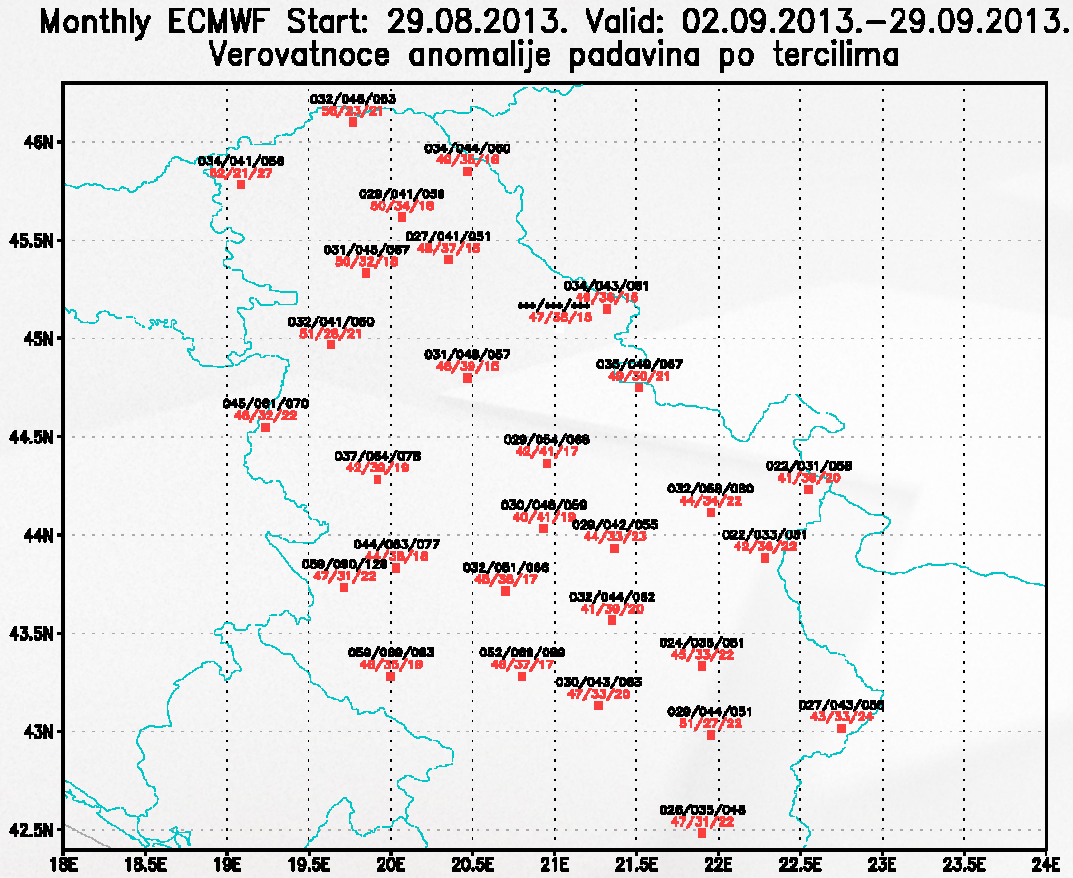


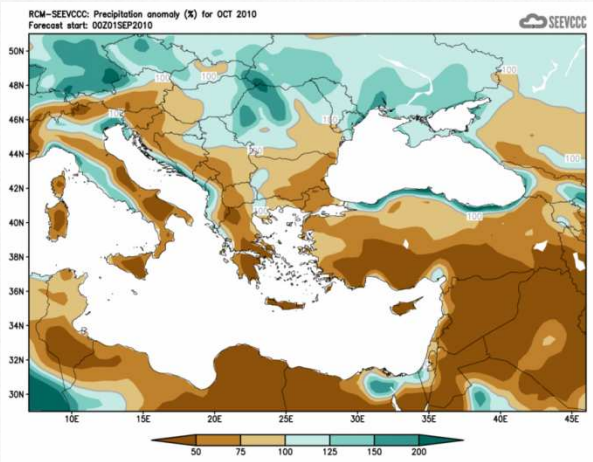
Forecast issued 29.08.2013.; valid 02-29.09.2013.

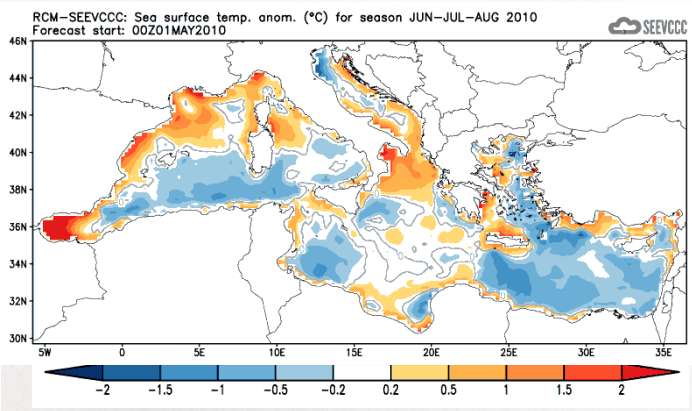
Long Range Forecast / Seasonal forecast

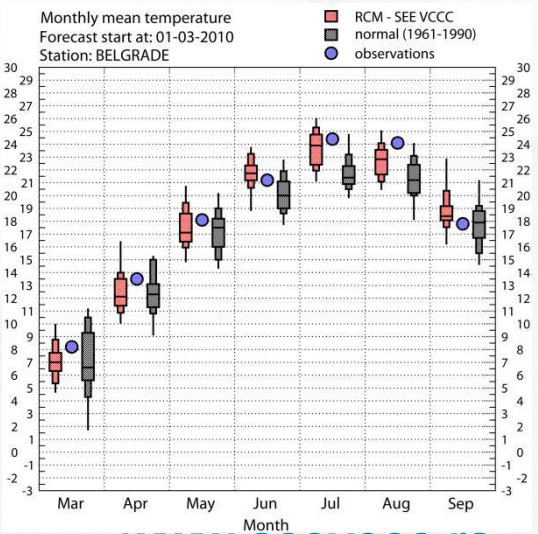
SEE VCCC

- **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 available in GRIB via WIS-DCPC-Belgrade







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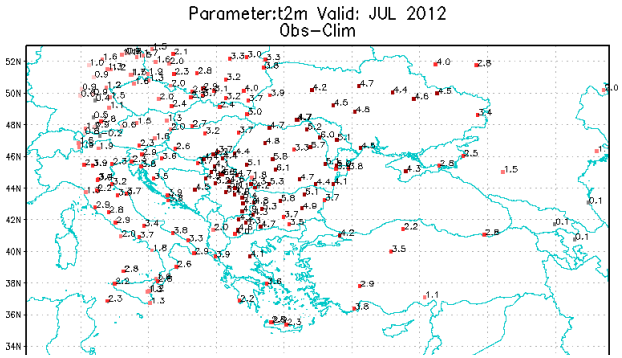
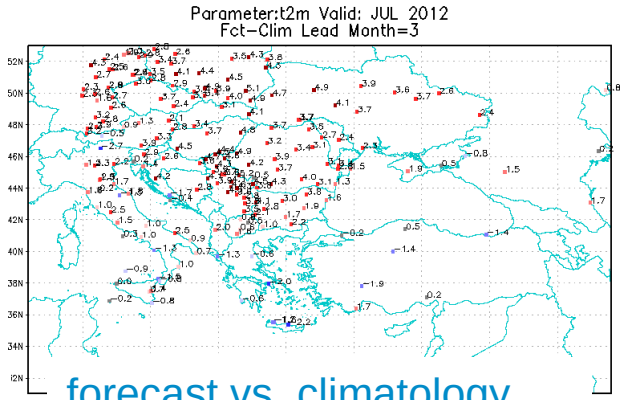
LRF- seasonal forecast - verification

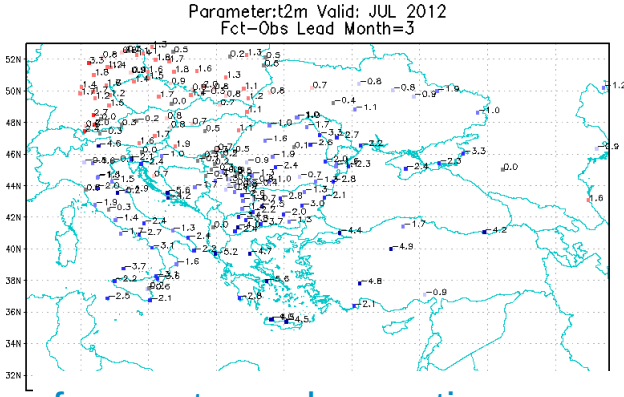
- Operational forecast verification 2009-2013 - monthly
- Probabilistic and deterministic verification – in situ observations ECA&D



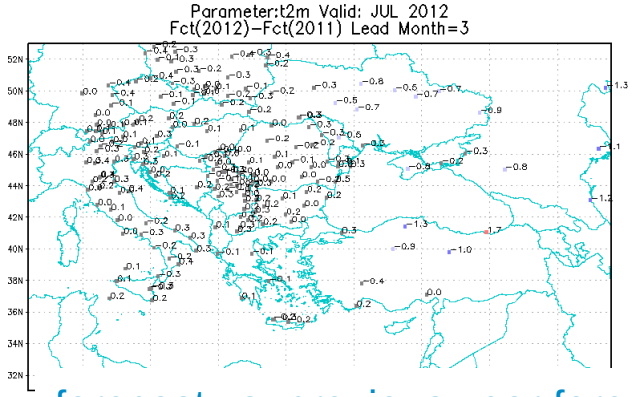
observations vs. climatology



forecast vs. climatology



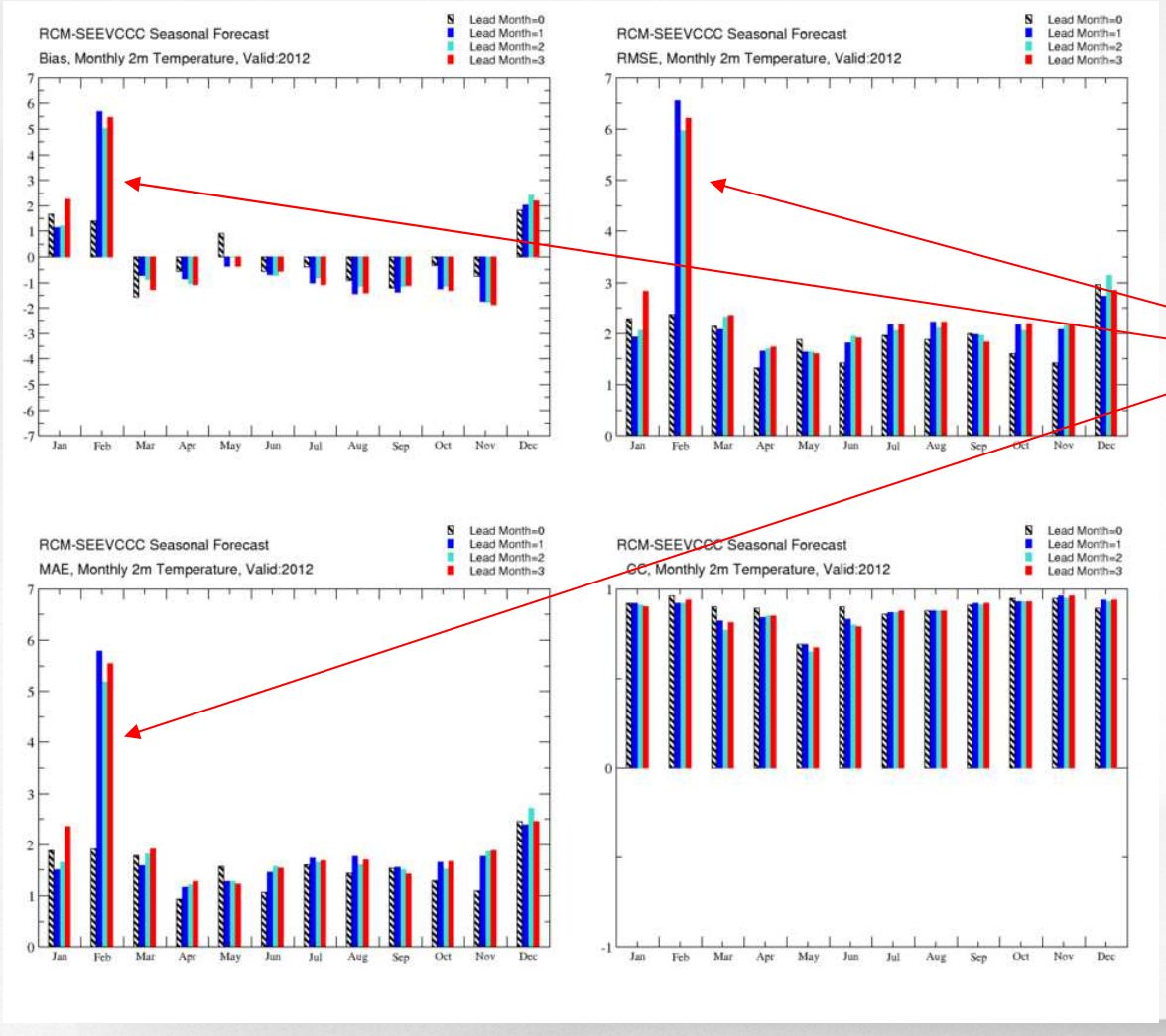
forecast vs. observations



forecast vs. previous year forecast

LRF- seasonal forecast - verification

- Operational forecast verification 2009-2013 - monthly
- Bias, RMSE, MAE, Correlation Coefficient – spatial



1-4 lead months

February 2012

Year 2012

~ 200 stations – ECA&D

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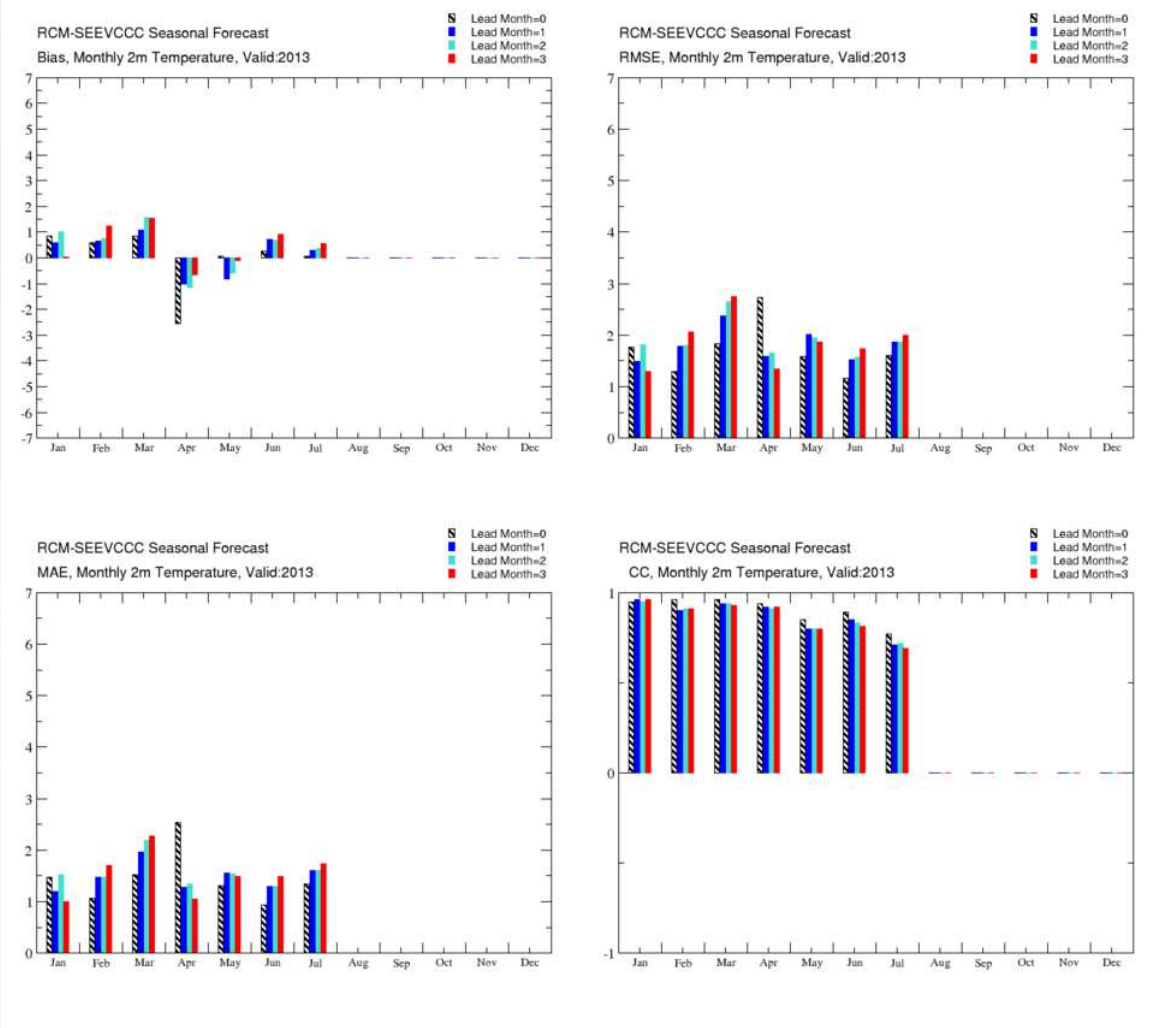
LRF- seasonal forecast - verification

- Operational forecast verification 2009-2013 - monthly
- Bias, RMSE, MAE, Correlation Coefficient - spatial



1-4 lead months

Year 2013

~ 200 stations – ECA&D

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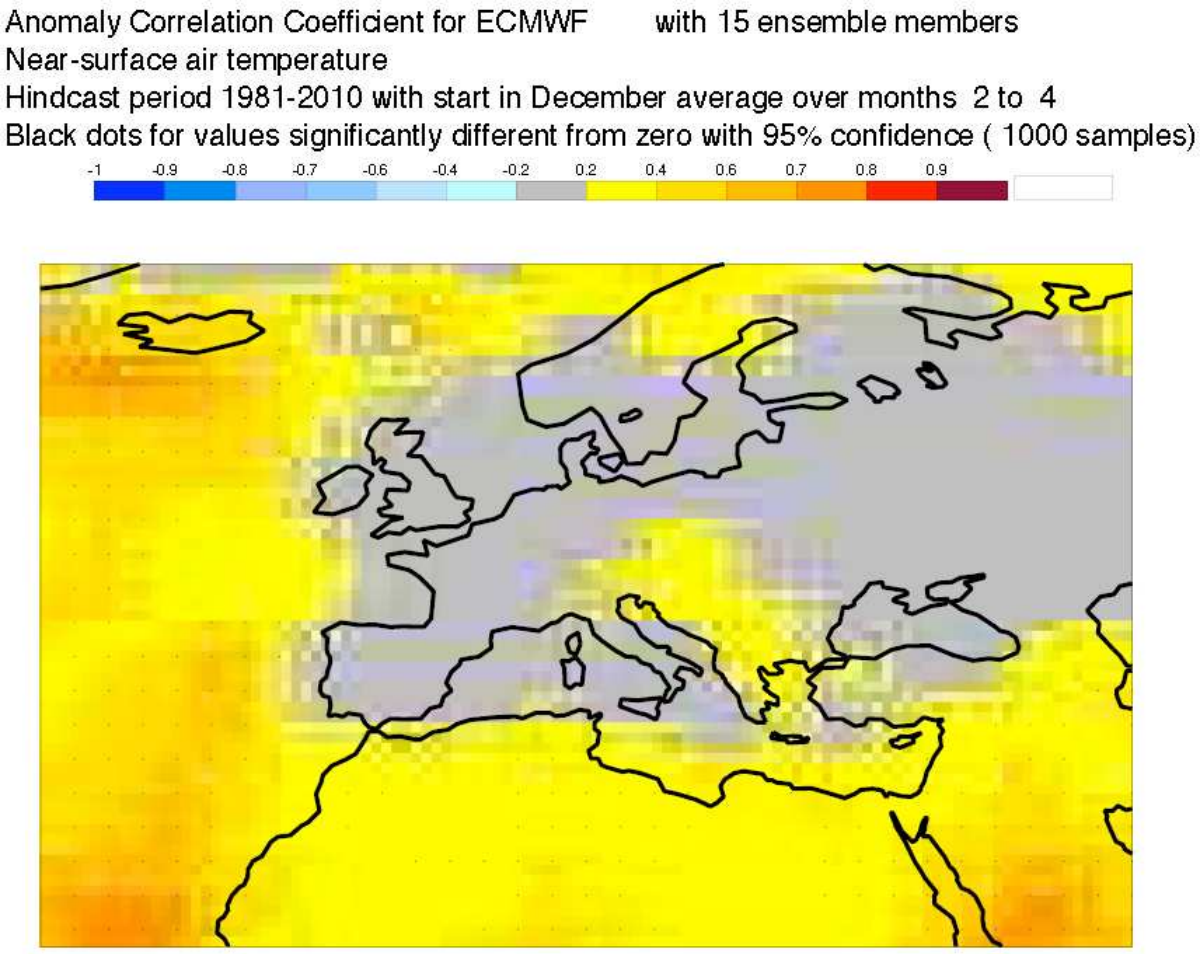
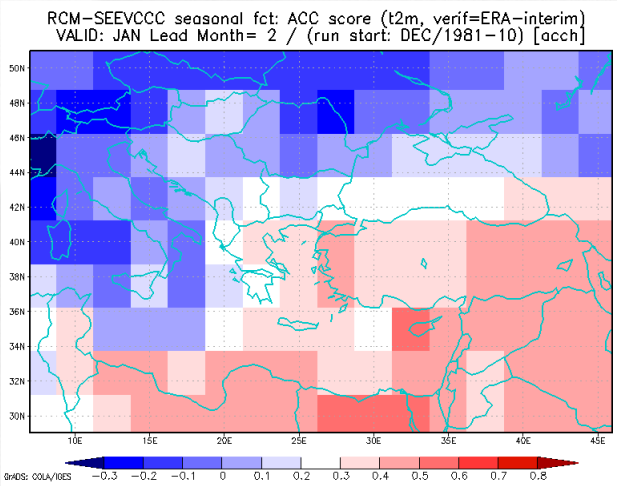
ECMWF ACC – hindcast JFM

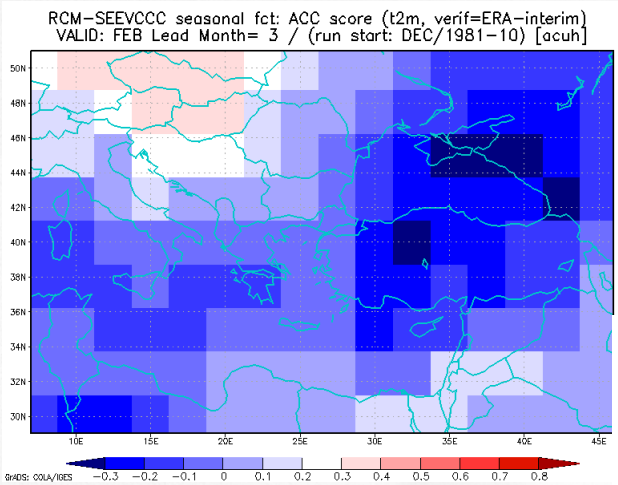
Lower predictability for winter season

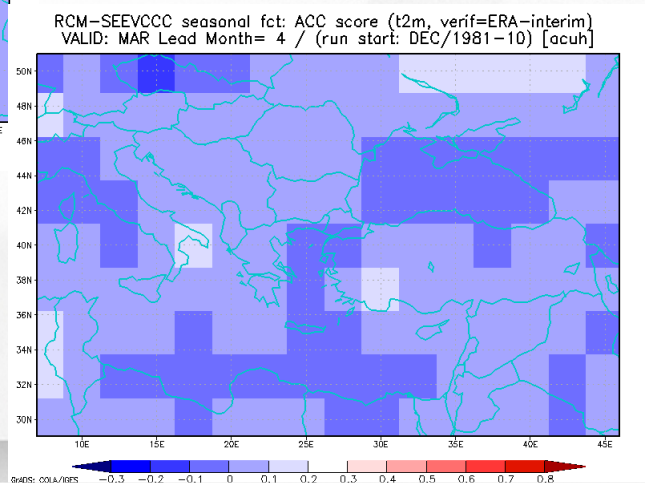


Long Range Forecast / Seasonal forecast

- Hindcast period 1981-2010
- Start December – 7 lead months
- Probabilistic and deterministic verification – in progress







Ensemble mean ACC score for T2m
with respect to ERAInterim

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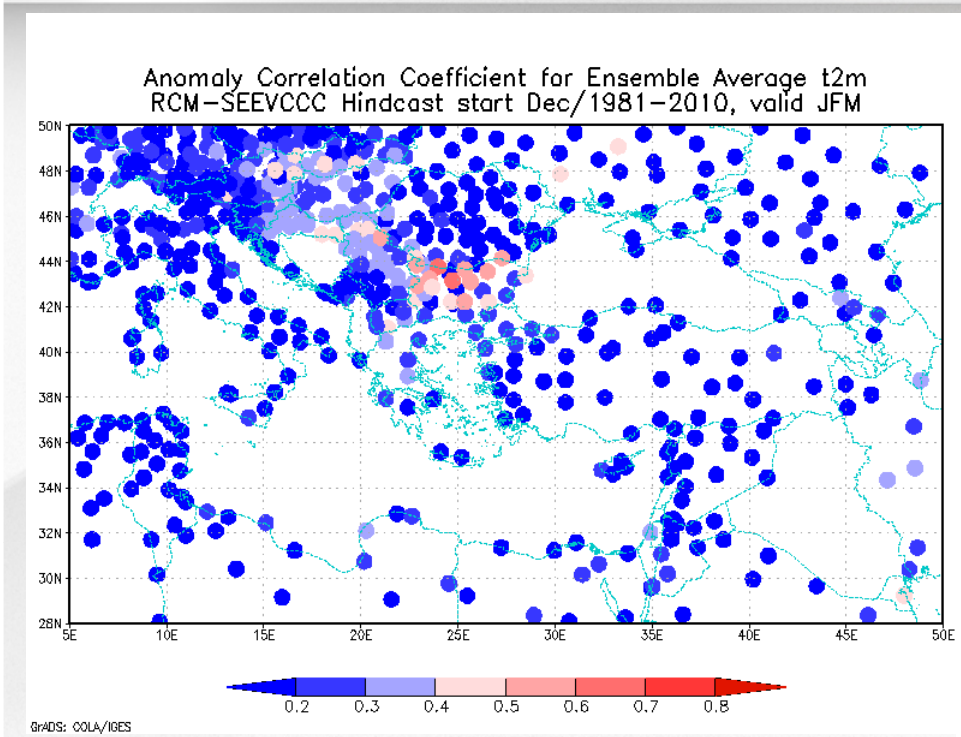
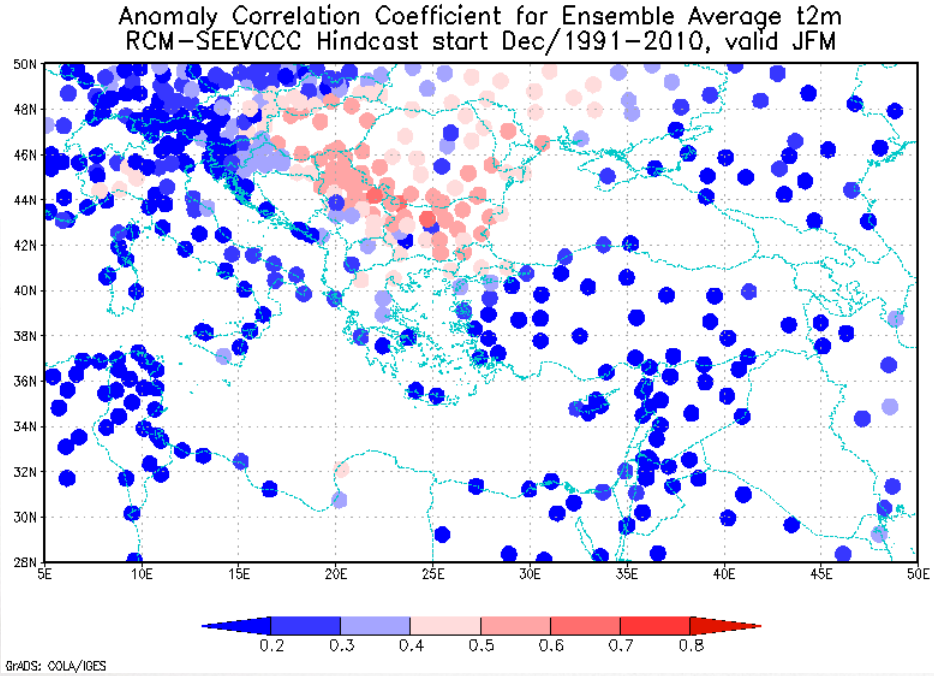
RCM-SEEVCCC ACC – hindcast JFM



1981-2010



1991-2010

RCM-SEEVCCC Skill Score – hindcast JFM

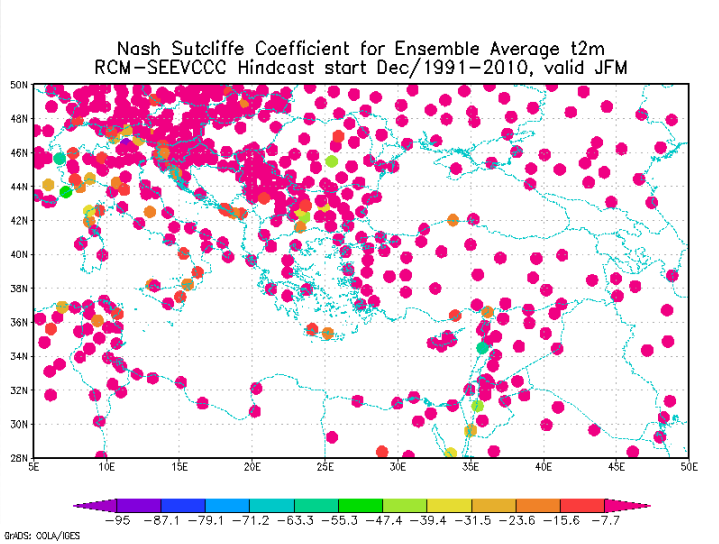
Inflation of variance – correction

Climatological variance of ensemble members should be the same as climatological variance of observations

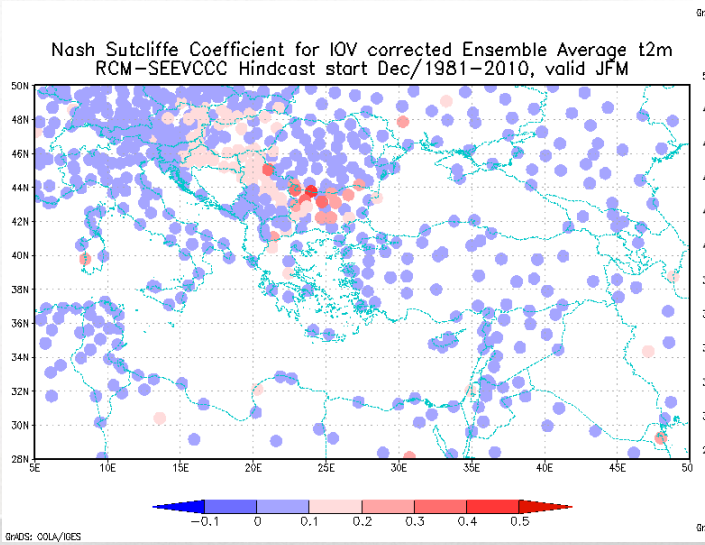
Skill Score (SS) = 1 – MSE/MSEclim

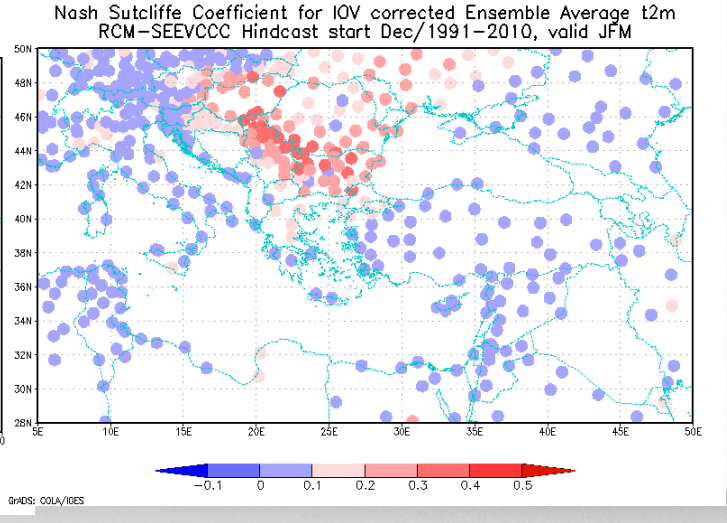
SS=0 for climatological forecast

raw forecast

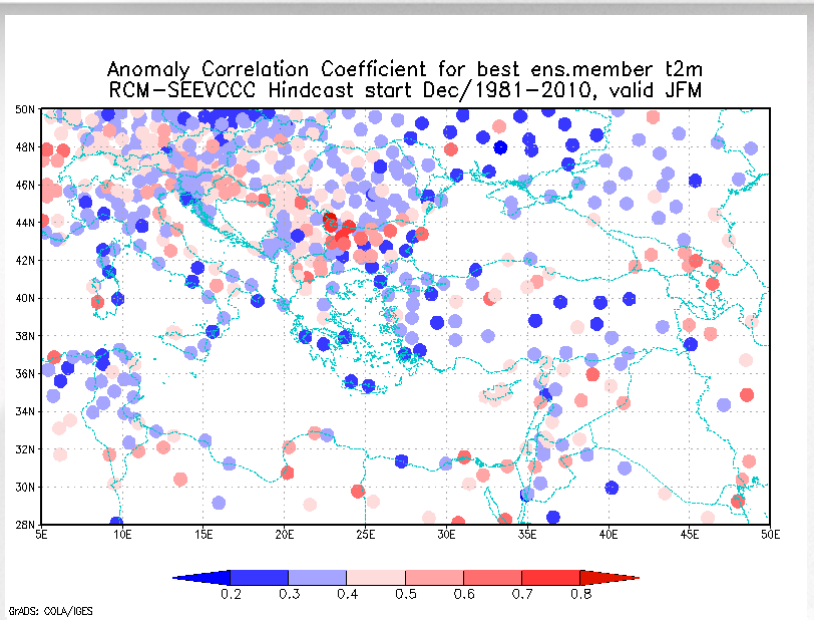


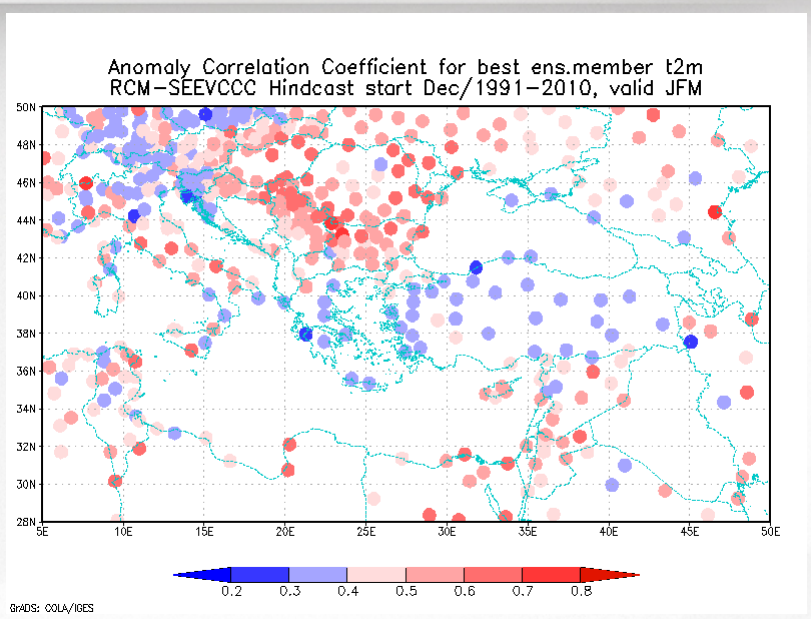
corrected forecast

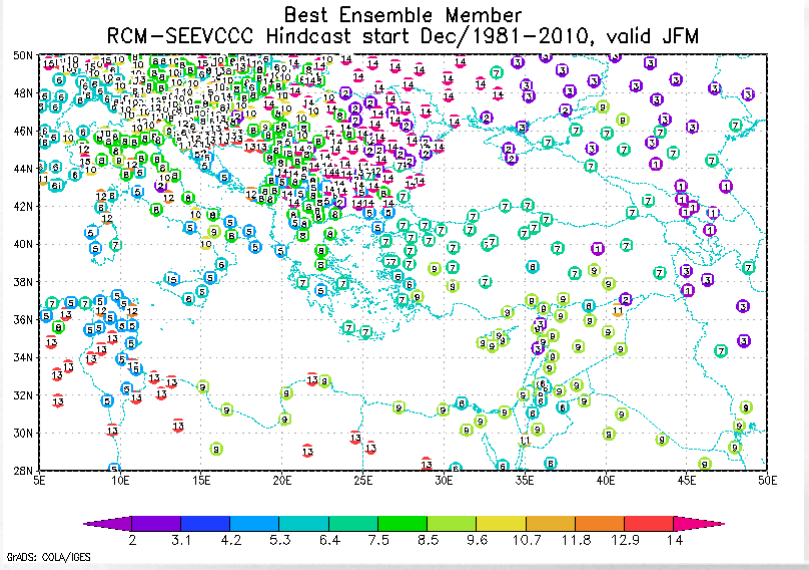


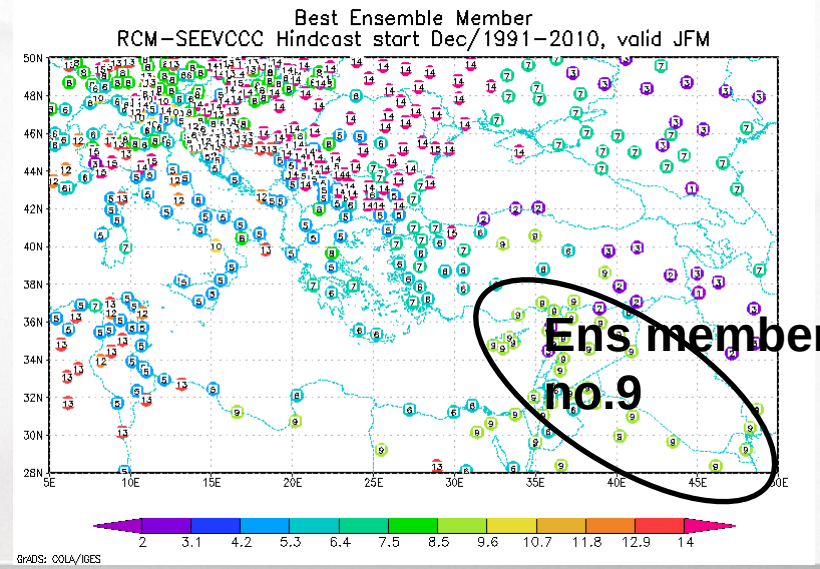


RCM-SEEVCCC ACC best ens. member – hind. JFM

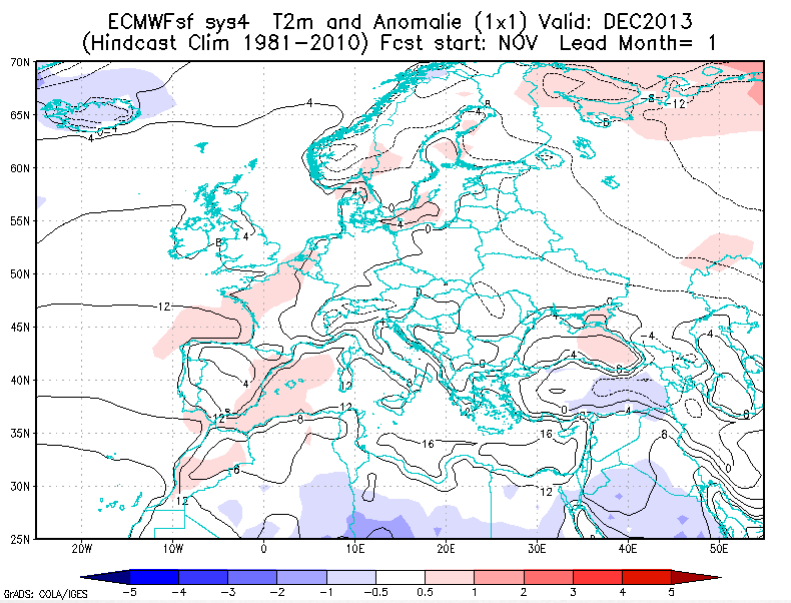




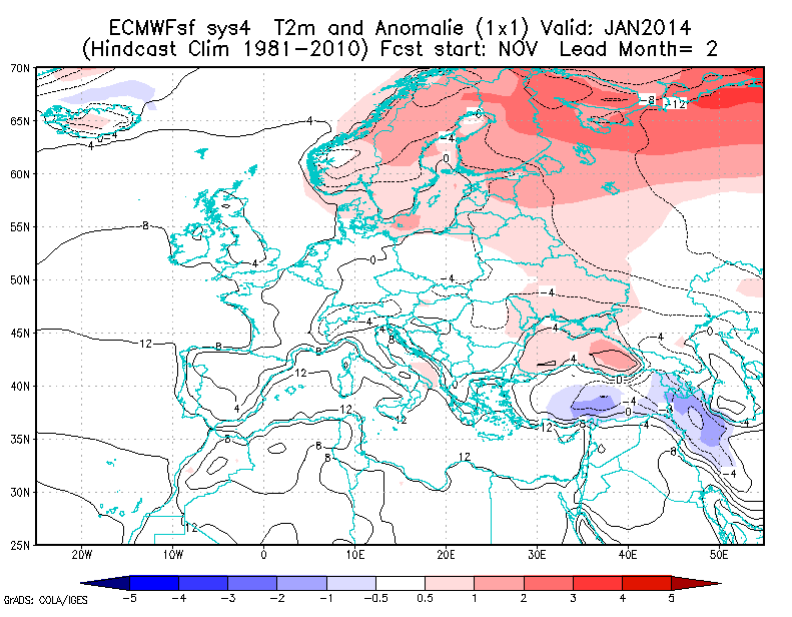


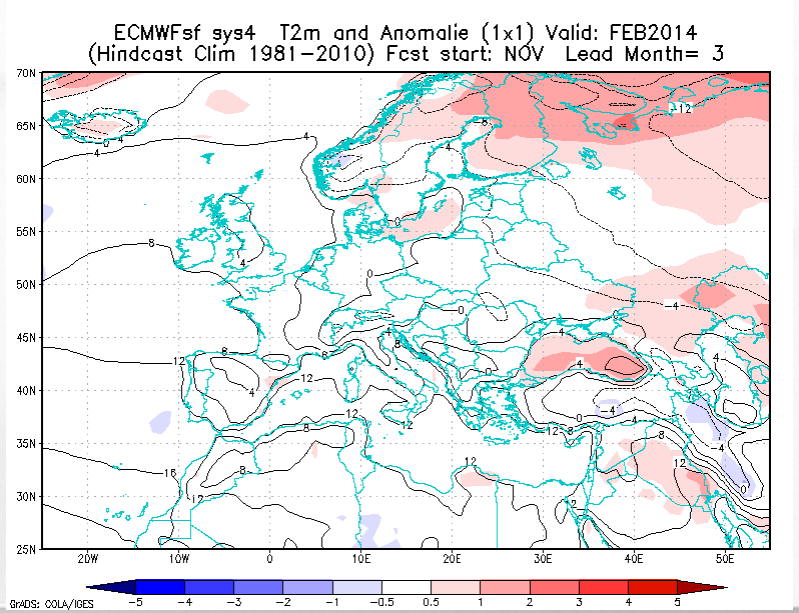


ECMWF seasonal forecast for DJF 2013



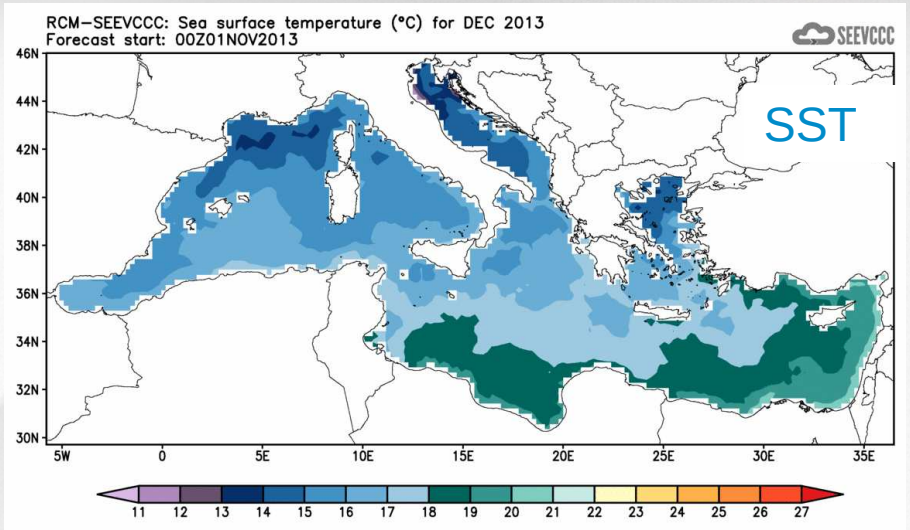
forecast issued November 2013

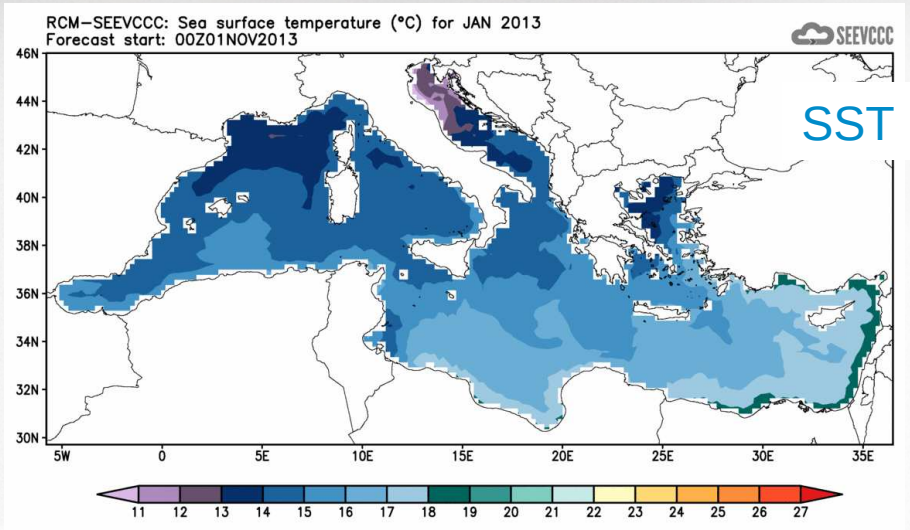


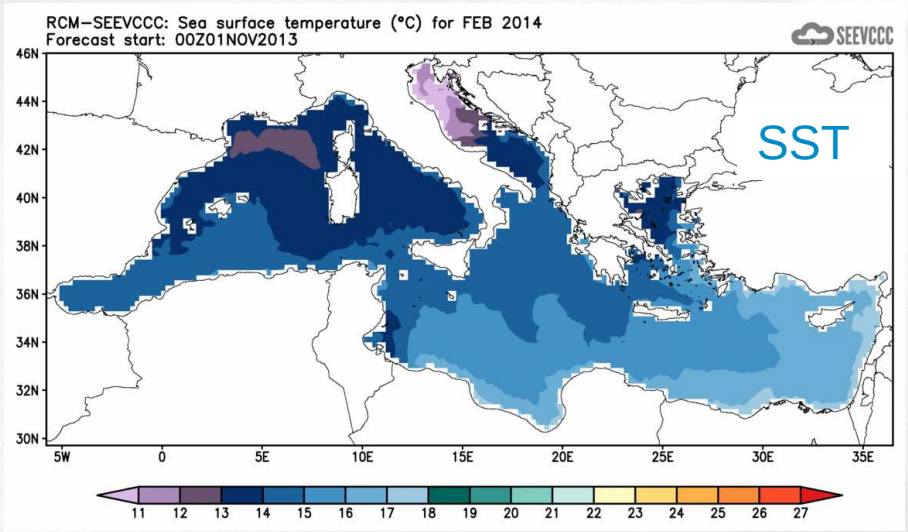


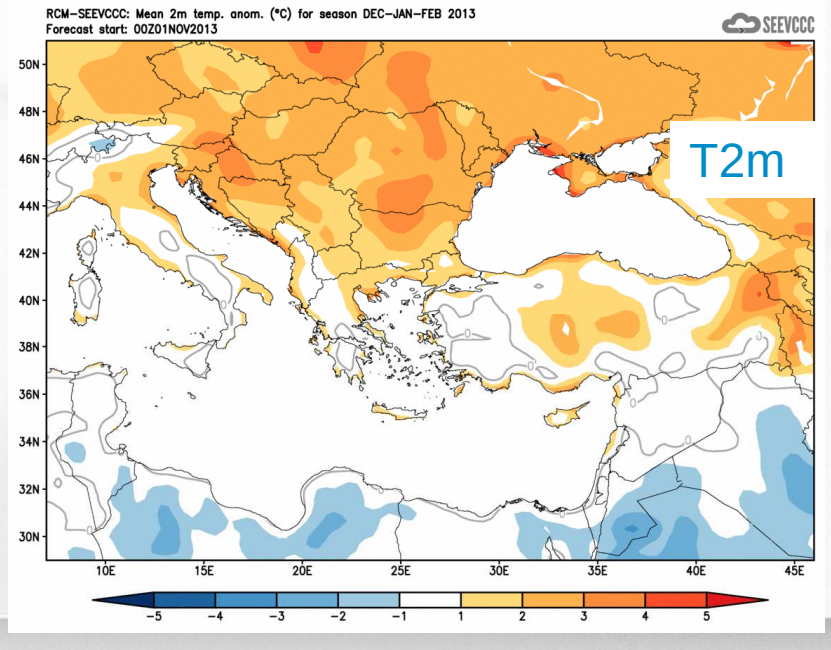
RCM-SEEVCCC seasonal forecast for DJF 2013

forecast issued November 2013









WMO RA-VI RCC nodes – Climate Watch System

Climate Watch (Serial No.: 20120630 – Number)

Initial/Updated/Final

Topic: Drought/Fire		Warning:	0	No particular awareness
Organization issuing the statement:	Republic Hydrometeorological Service of Serbia		1	Potentially dangerous
			2	Dangerous
Issued/ Amended / Cancelled	11-09-2012 12:00 P.M.		3	Very dangerous
Contact:	E-mail: x.y@hidmet.gov.rs Phone: +3811XXXXXX Fax: +3811XXXXXX			
Valid from – to:	10-09-2012 – 24-09-2012	Next amendment:	18-09-2012	

Region of concern: Western Balkans

Monitoring

...

In the region of Western Balkans, in the period from September 2nd to 8th, mean temperature anomaly ranged from +1°C to +5°C compared to the 1981-2010 normal. There was no significant precipitation in most of the region, except in the biggest part of C to 25 mm was recorded.

During the same period in Serbia mean temperature anomaly compared to the 1981-2010 normal. The recorded precipitation a mm.

...

Impacts – Conclusion

Warmer and dry period is expected to continue, which will bear an impact on agricultural production, water quantity in hydro-accumulations and elongation of the period of increased forest fire risk.

According to preliminary data, during the previous two months, over seven thousand fires were recorded in the region (six thousand in Serbia), and first estimations show that the inflicted damage amounts to over 60 million Euros (Serbia – 50 millions, Montenegro – 10 millions).

CWS issued by SEEVCCC

Monitoring based on DWD-GPCC

Forecast based on ECMWF monthly and RCM-SEEVCCC seasonal forecast

http://www.seevccc.rs/CWS

Data archived in MARS (ECMWF) in SEEVCCC/DCPC (WMO WIS)

- Seasonal forecast – ensemble long range forecast using RCM-SEEVCCC model
- Regional 3 and 5 day forecast – using WFRNMM model
- Dust forecast – with and without assimilation using DREAM model
- Global forecast – using GNMMB model
- Climate projections – for A1B and A2 scenarios using RCM-SEEVCCC model
- Regional observations in BUFR format
- Projects: Aral sea, Iran, Sintex-G, Hadley center climate simulations, etc.

batch request5
Estimated number of fields: 1

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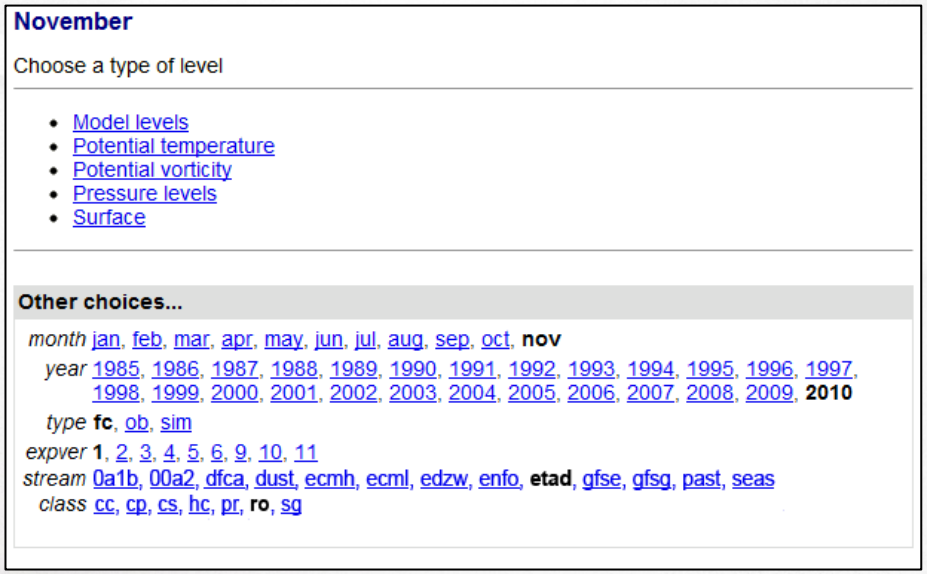

http://wis-geo.hidmet.gov.rs:8080/geonetwork/srv/en/main.home

THANK YOU FOR YOUR ATTENTON!

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wis-geo.hidmet.gov.rs:8080/geonetwork/srv/en/main.home