Seasonal forecast post-processing development for the local end-user benefit

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Model

Long Range Forecast:

- RCM-SEEVCCC – fully coupled atmospheric-ocean model
- Euro-Mediterranean region
- Dynamical downscaling of ECMWF LRF
- 51 ensemble members
- Updated each month (leading month + 6 months of forecast = 7 months)
- Resolution ~25km
- Database: since 2009, model output available on every 6h of forecast
- Products: monthly and seasonal temperature (air and sst) and precipitation (absolute and anomalies with respect to 1961-1990 observed climatology)

Application of LRF

Users

- Early warnings
- Sectors of economy (energetics, agriculture, forestry, hydrology,…)
- ….
- => decision makers

Products of stochastic ensemble LRF should be prepared in the form understandable for the end-users

⇒create special products as part of operational post-processing of the model output

⇒use of products in:

planning of energy consuming in upcoming season (planning of production and import)

planning of food production and import with fixed prices

risk reduction and insurance from extreme events (draught)

….

Example of LRF “special” operational product for agriculture

Year 2012 – heat wave in Serbia

- Impact on growing season duration
- LRFs used: leading months January – September 2012
- local – “in point” anlysis
- Rimski Sancevi station, Vojvodina
- Base temperature 10C (corn, grapevine,…)
- LRF vs. observations
- Stochastically determined mean monthly temperature (usual product)
- Stochastically determined special products:
  - Beginning/end of the growing season date– according to WMO standard
  - Ripening date for grapevine (early and late varieties)
  - => forecast of the single event

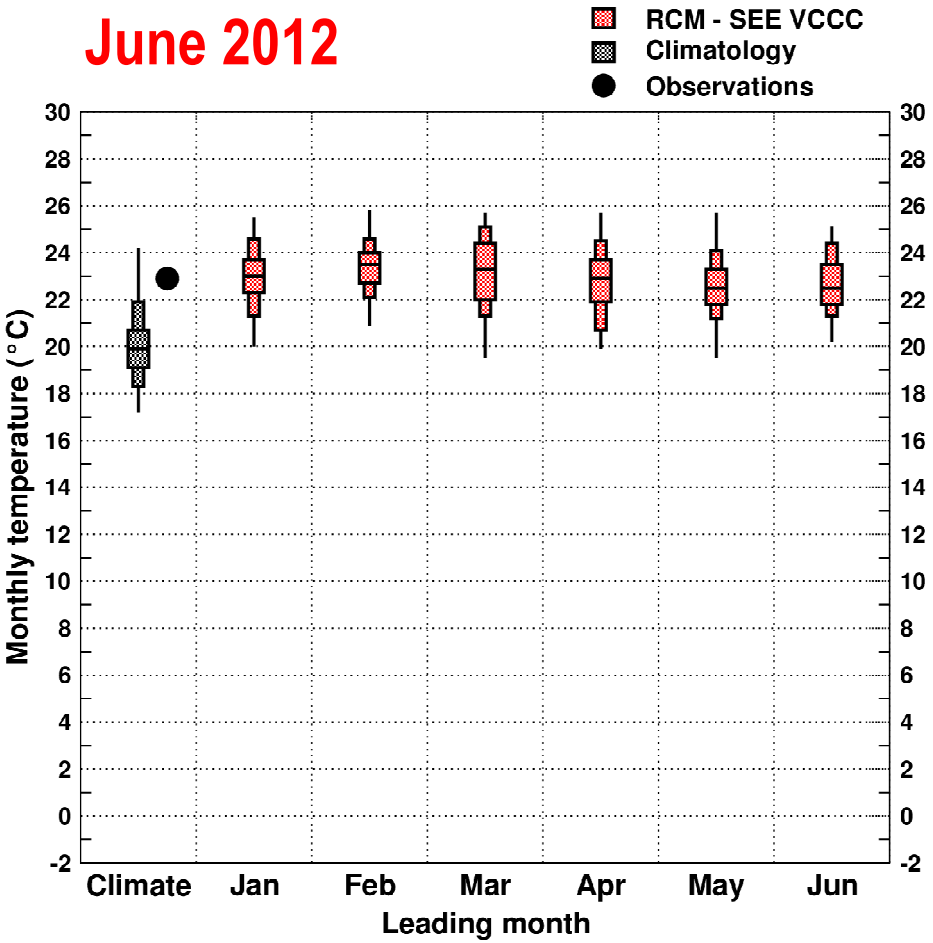
Mean monthly temperature forecast during the heat wave

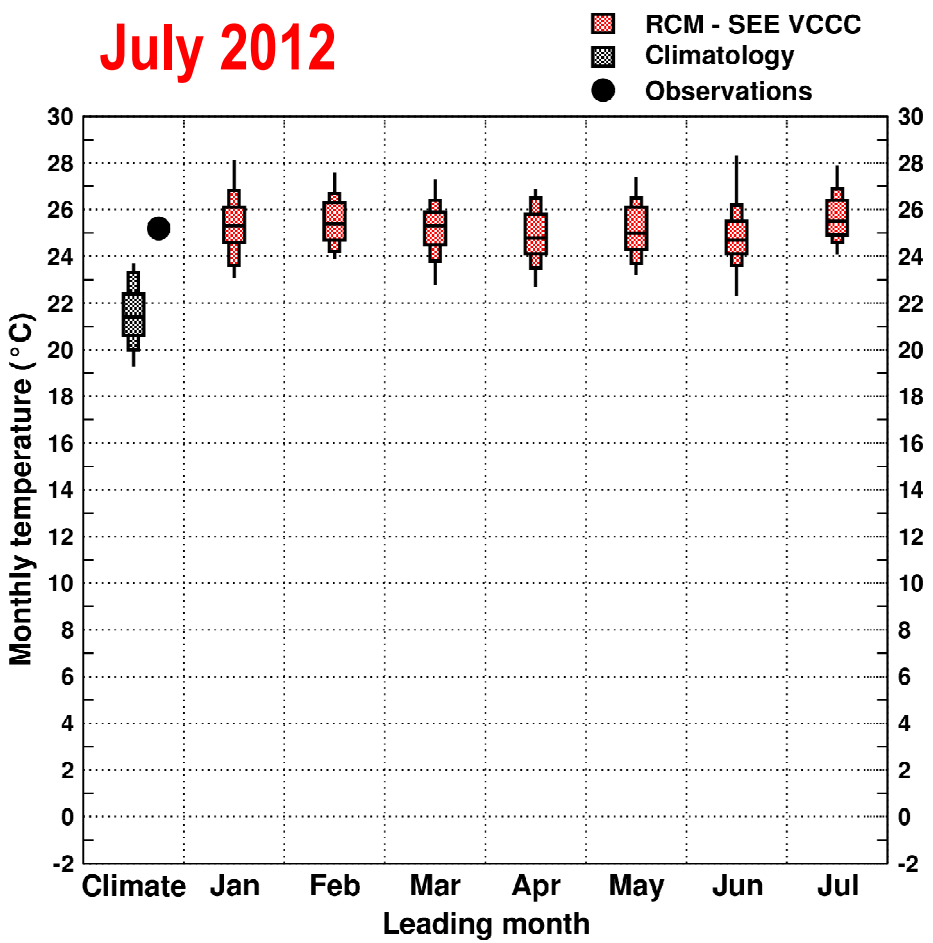
Leading months: January – September 2012

Climatology: 1961-2010

Observations: Rimski Sancevi, Vojvodina, Serbia, 2012

Percentiles: (min),10, 25, 50, 75, 90, (max)





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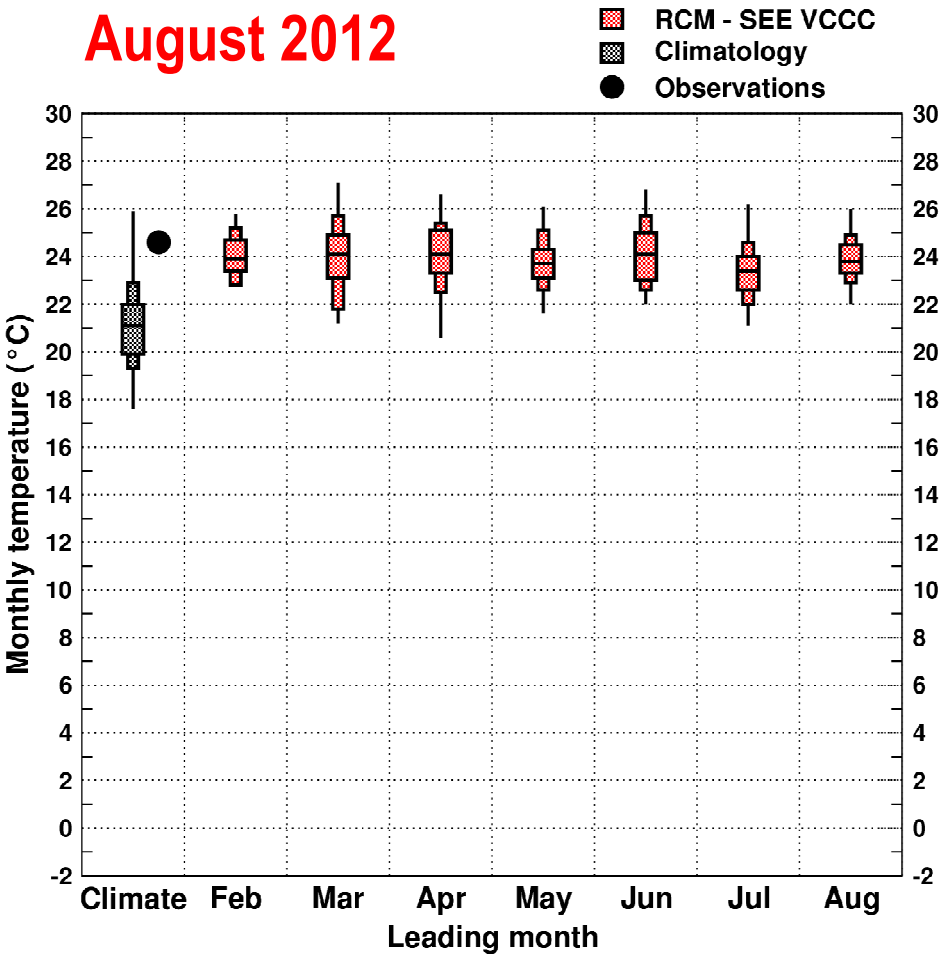

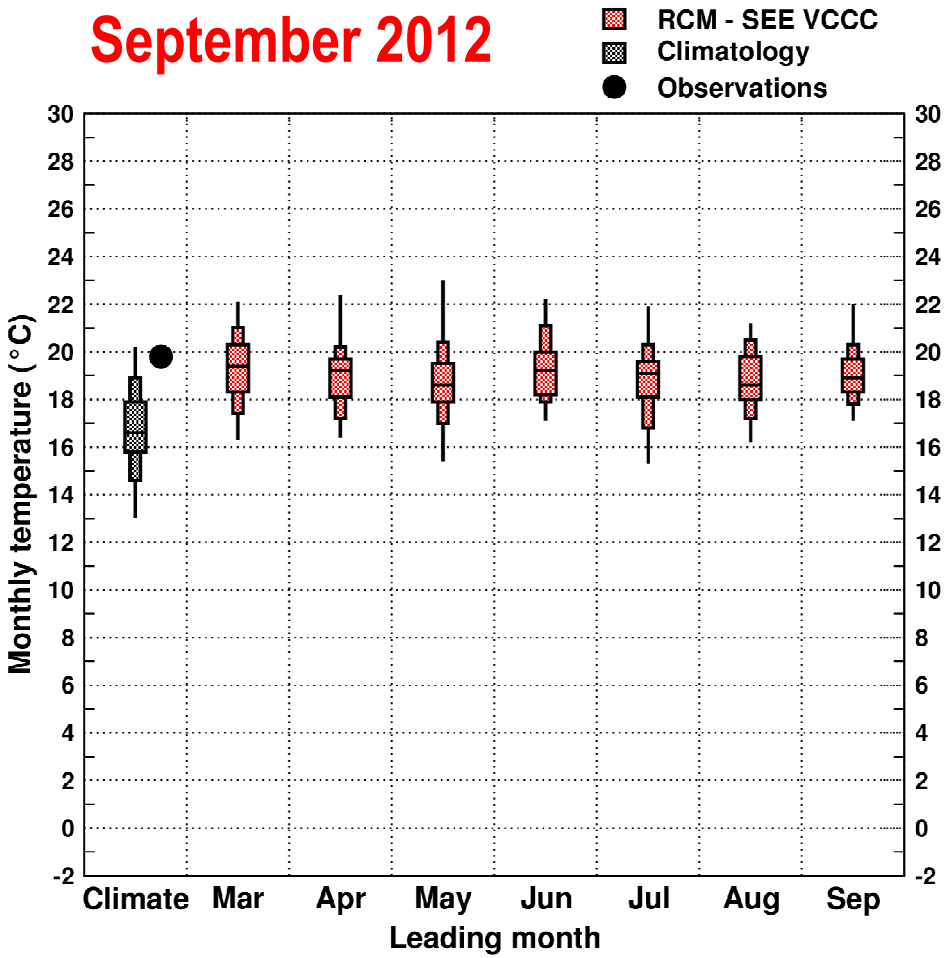

Start/end of the growing season period – year 2012

6 consecutive days with T>10C during Jan-Jun – start

6 consecutive days with T<10C during Jul-Dec – end

Leading months: January – September 2012

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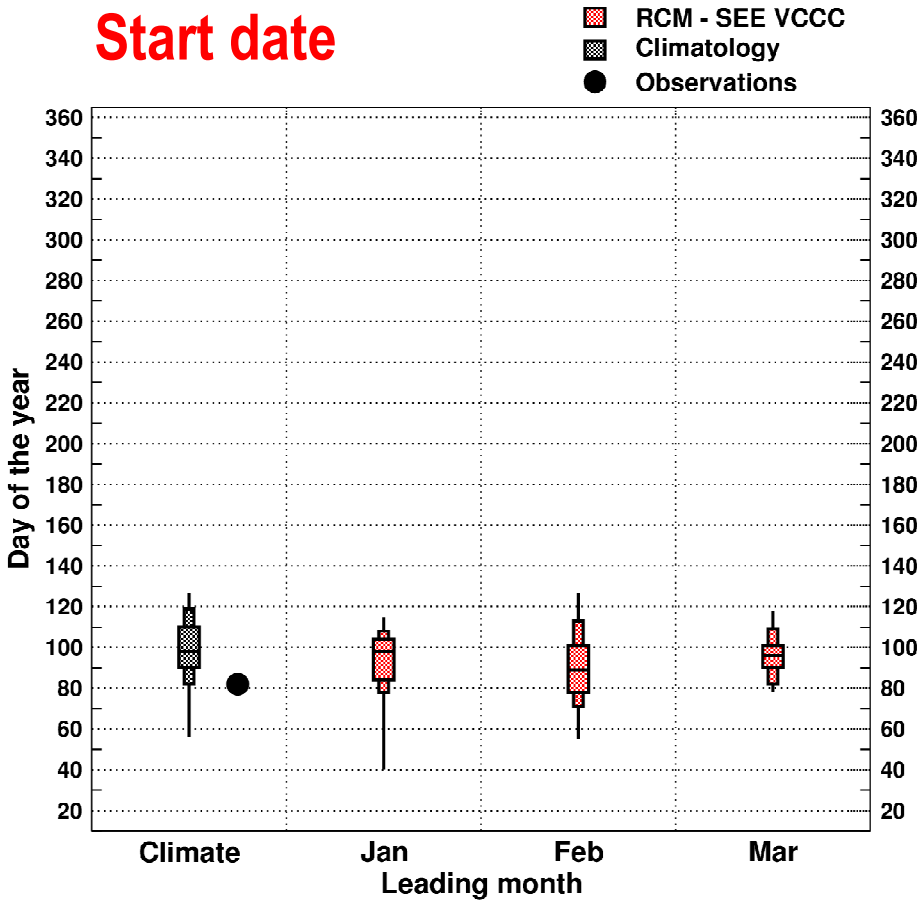

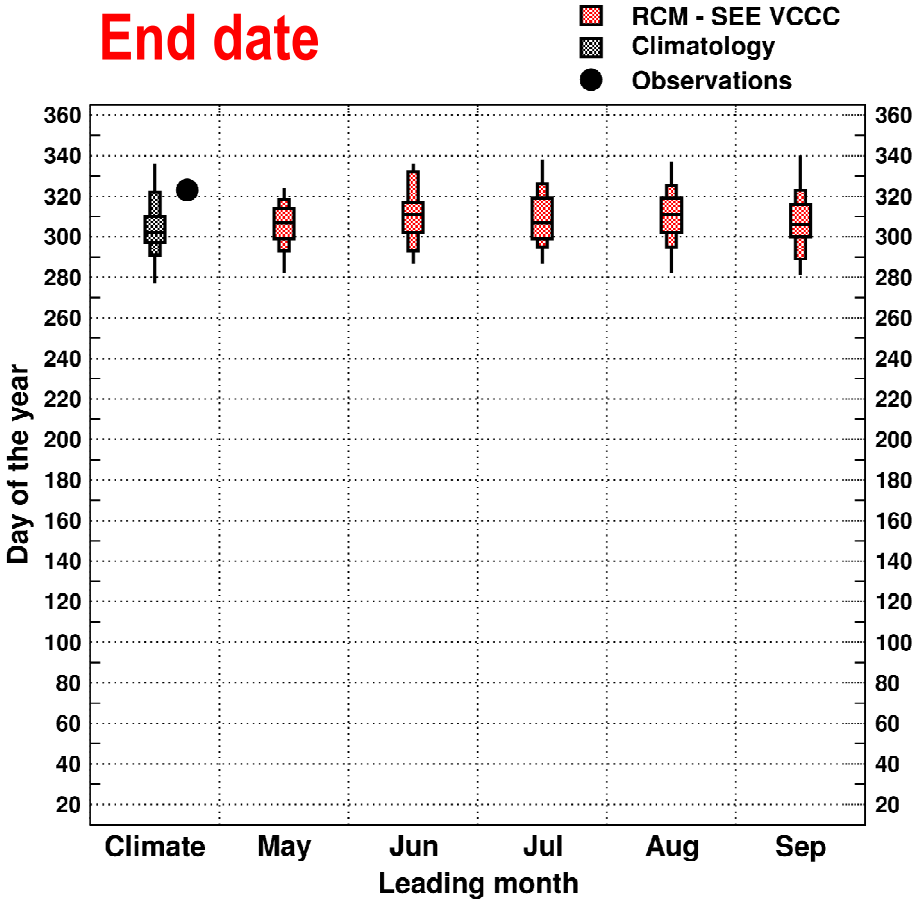

Grapevine ripening date for GDD 2800/3500 – year 2012

Start of the growing season fixed on 1.april, GDD=sum(T), if T>10C

Ripening date = first day when GDD reached 2800/3500 heat units

Leading months: January – September 2012

Observations: Rimski Sancevi, Vojvodina, Serbia, 2012

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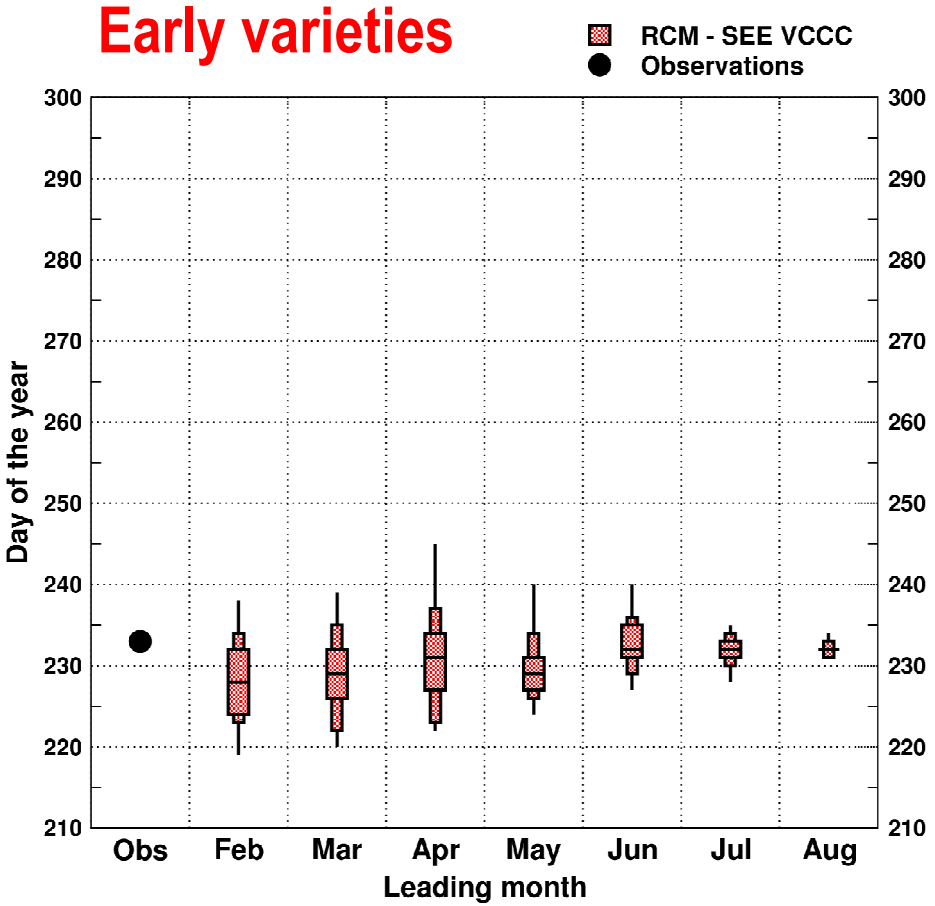
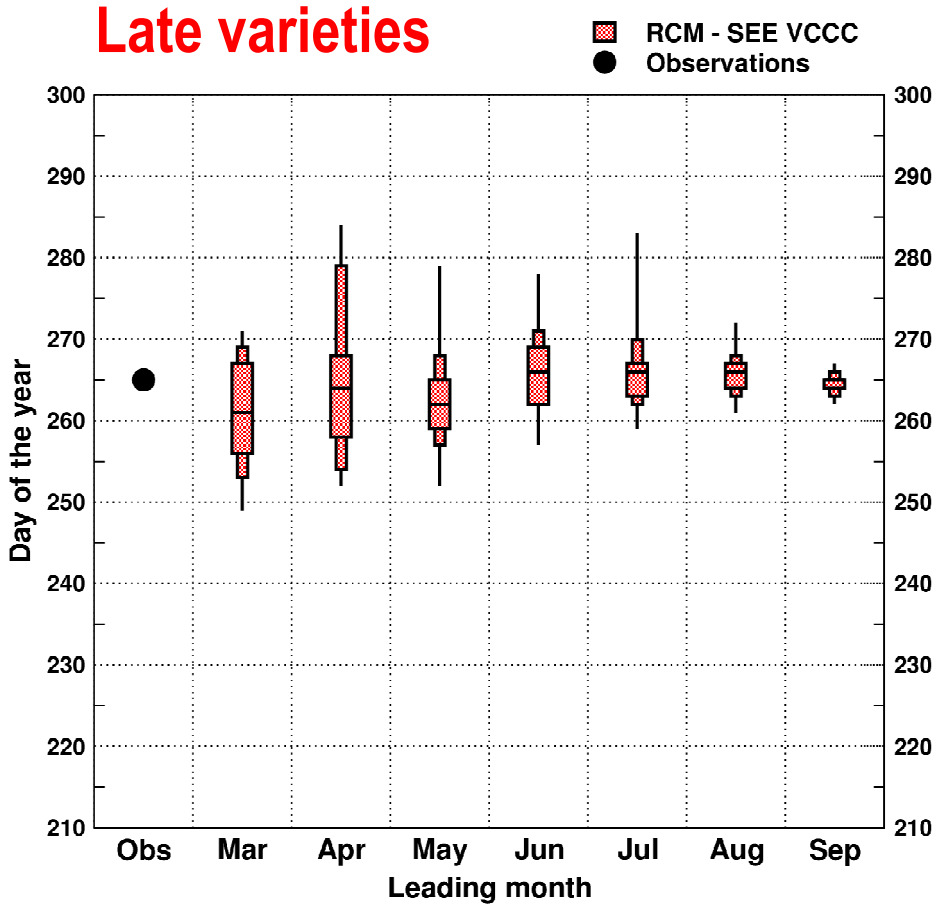




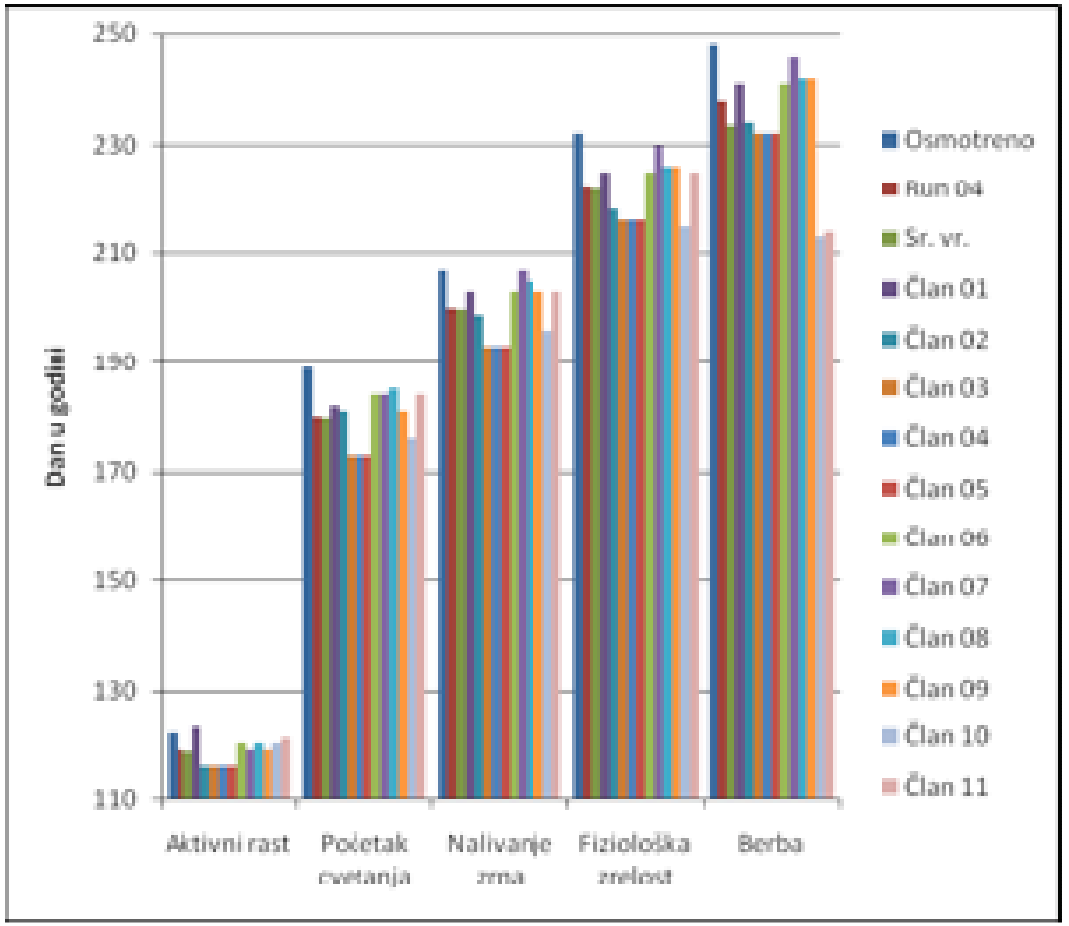
Use of LRF and CropSyst

Corn; Year 2012; Leading month: April 2012

11 ensemble members

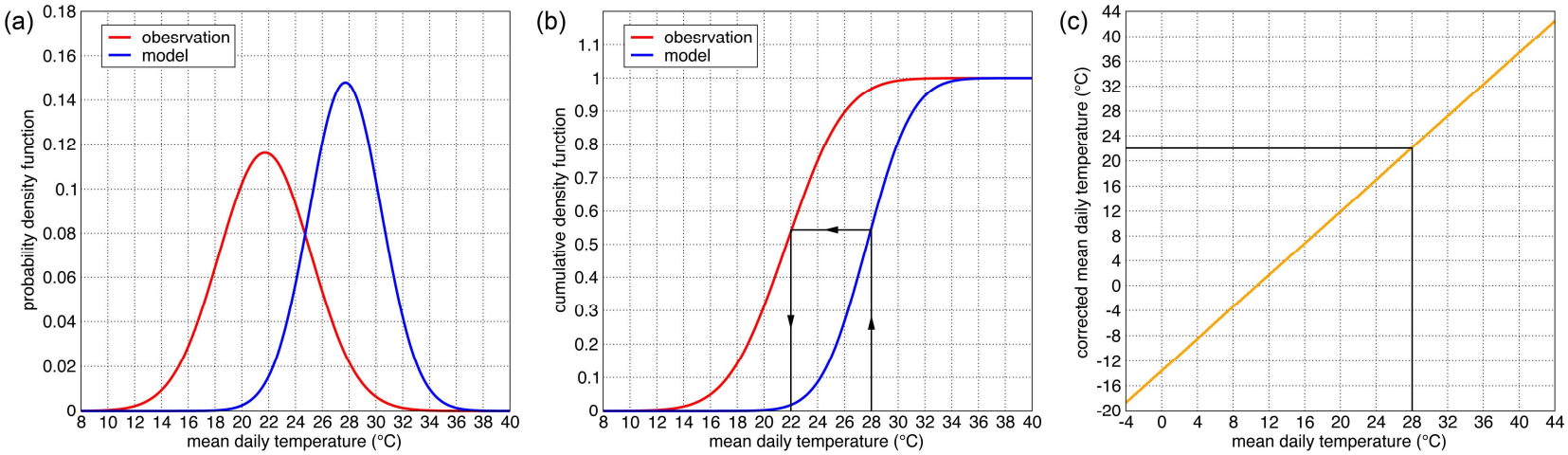
Observations: Smederevska Palanka, Sumadija, Serbia, 2012

- Simulated phenology stages
- Using observations and LRF
- Results mainly within 10-20days
- Problems:
  use of precipitation data
  crop model simulation of soil wetness
  other uncertainties in crop model parameters ….



Future work

- HINDCAST (1981-2010) <=> Computational resources
- Statistical correction of LRF model results;
  to create correction functions for each leading month and month of the forecast;
  important because model output is on 6h (especially for daily extreme temperatures)



- Best ensemble member method application
- Operational calculation of indices related to the end-user needs
- To have full system: LRF => monthly forecast => med./short range forecast