HOMOGENIZATION AND GRIDDING OF THE ROMANIAN CLIMATIC DATASET WITH MASH & MISH

Marius-Victor **Birsan** & Alexandru **Dumitrescu**

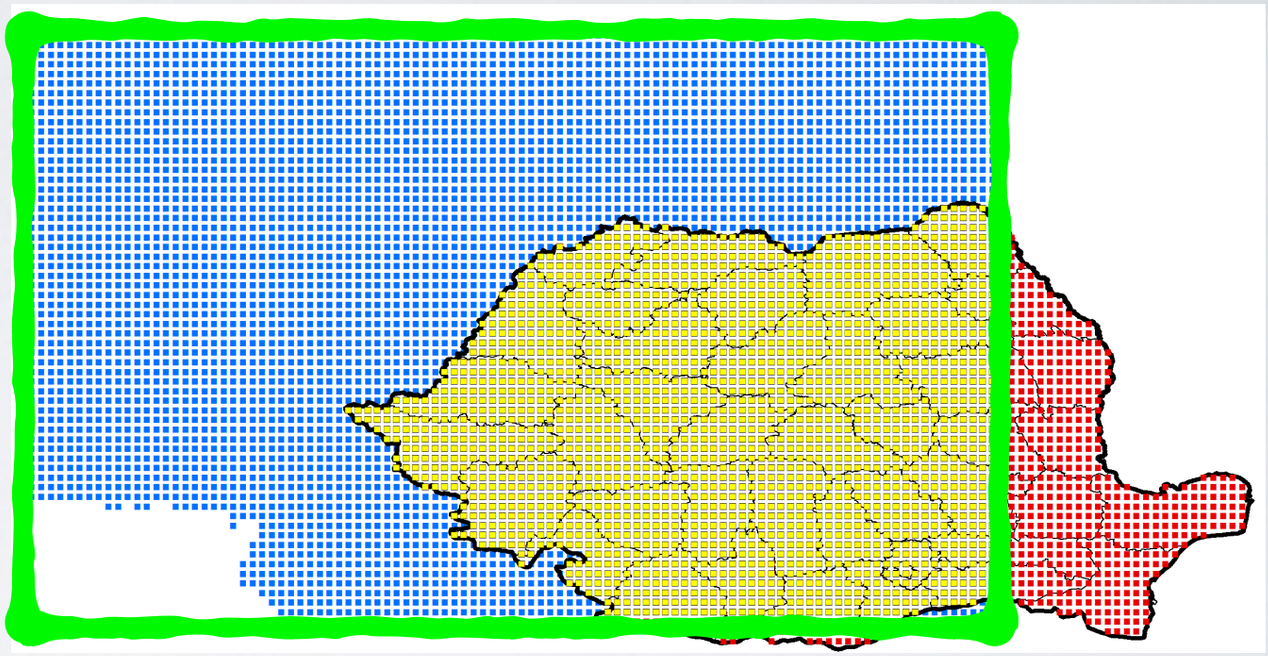
8th Seminar for homogenization and quality control in climatological databases
and
3rd Conference on spatial interpolation techniques in climatology and meteorology

Budapest, 12-16.5.2014

CONTEXT

CARPATCLIM

- Daily gridded data, 1961-2010;
- 10 parameters;



- The domain covers 79% of Romania;
- MASH (Multiple Analysis of Series for Homogenization);
- MISH (Meteorological Interpolation based on Surface Homogenized Data).

ROMANIAN **C**LIM**A**TE **DA**TASET

1961-2013 (updated yearly), **daily** time step;

Nine parameters (for now):

- Air pressure;
- Air temperature: min, max, average (from 6-hour data records)
- Soil temperature;
- Precipitation;
- Number of sunshine hours;
- Cloud cover;
- Relative humidity.

ROMANIAN **C**LIM**A**TE **DA**TASET

Two formats:

- **NetCDF** (Network Common Data Form): already available on request at euro4m.eu ;

- **CSV** (comma-separated values).

Will be available online on a data portal like PANGAEA (Data Publisher for Earth & Environmental Science), pangaea.de .

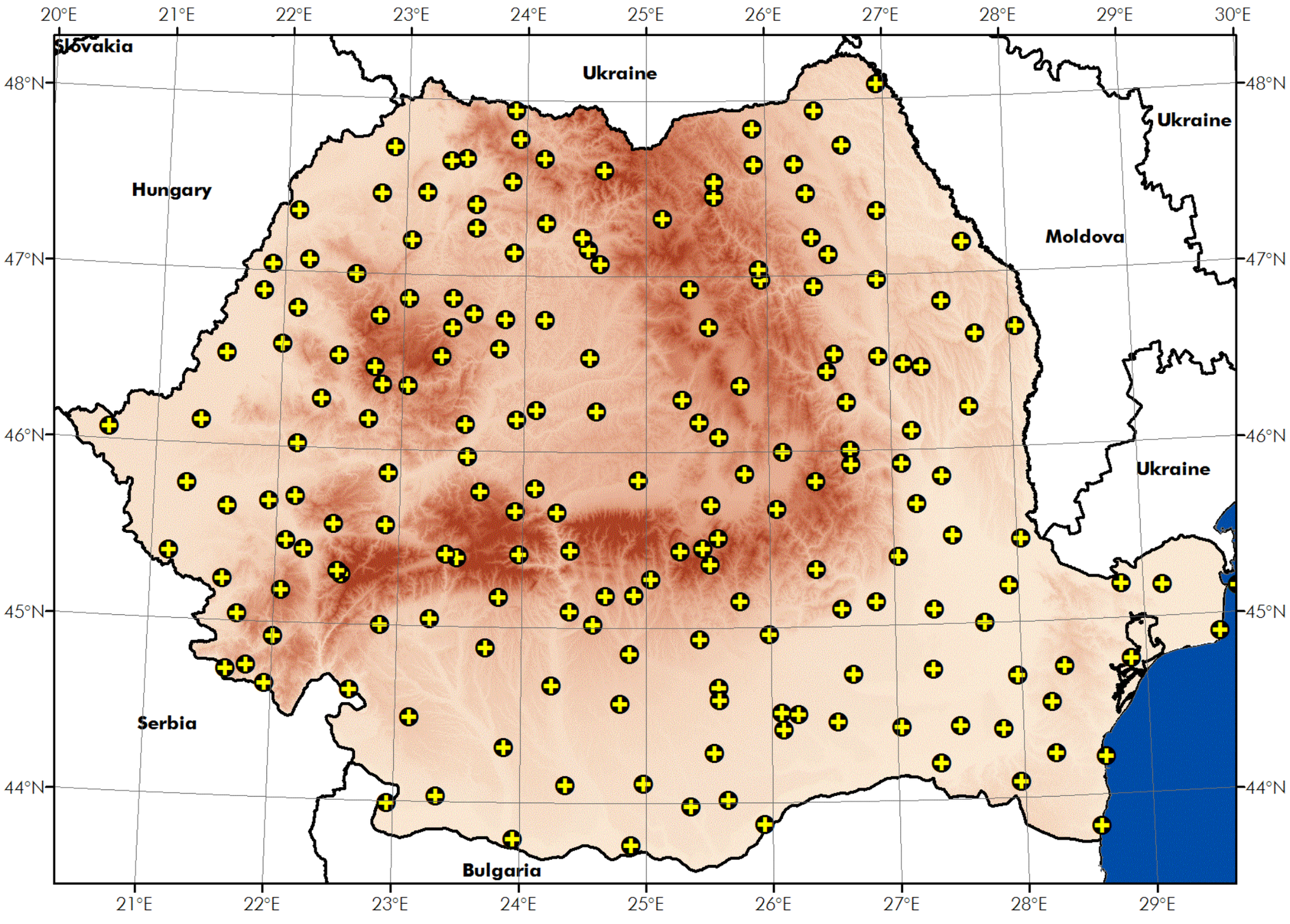
ROMANIA

- The largest country in southeastern Europe (238'391 km^2).
- The terrain is fairly equally distributed between mountainous (Carpathians), hilly and lowland areas.
- Elevation varies between zero and 2544 m.a.s.l.
- Various climate influences:
  - oceanic (in western part);
  - Mediterranean (South-West);
  - Baltic (North);
  - semi-arid (East);
  - Pontic (South-East).

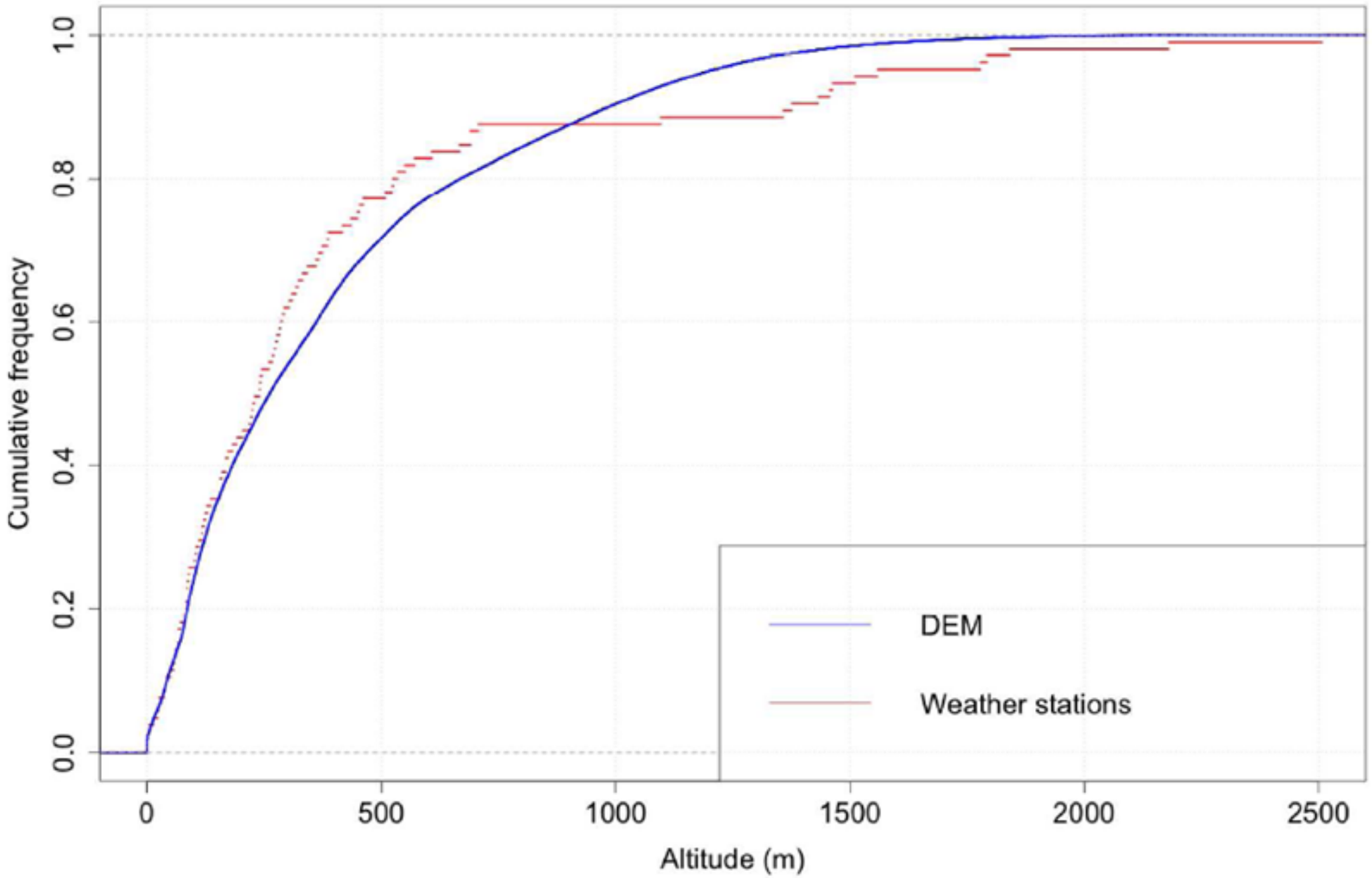
STATIONS / PARAMETER

Air pressure	150
Air temperature	150
Soil temperature	127
Precipitation	188
Sunshine hours	135
Cloud cover	104
Relative humidity	150

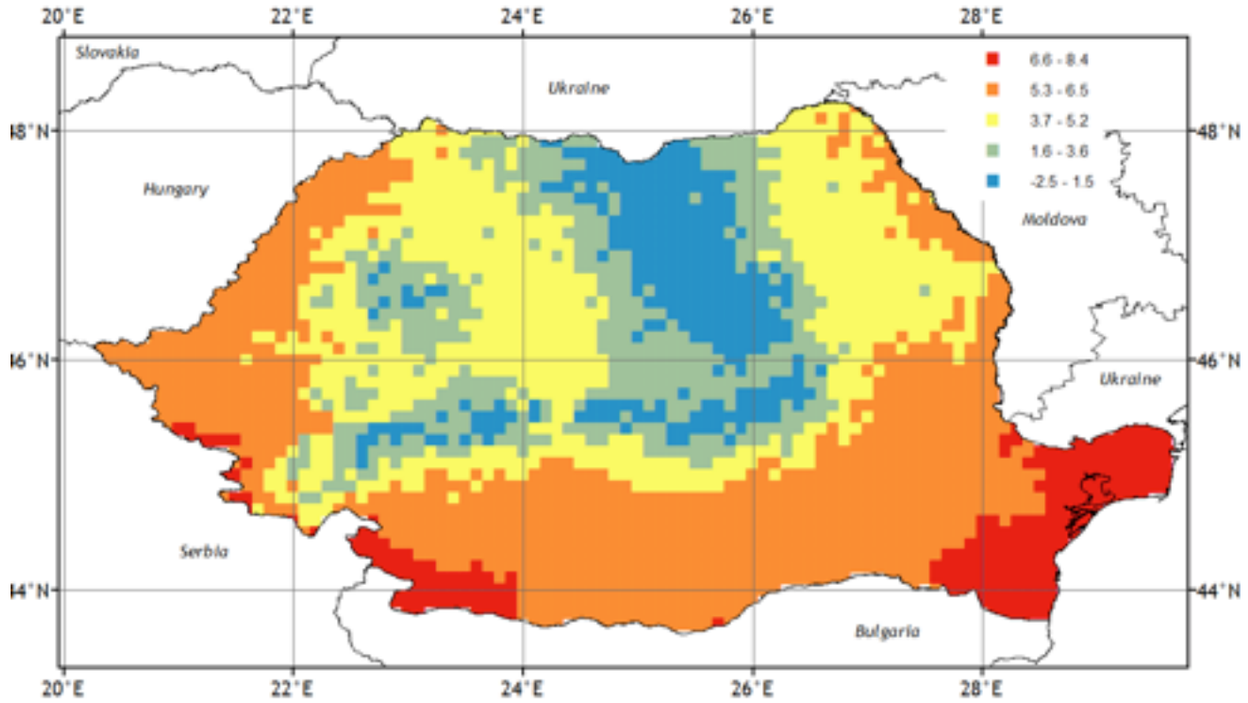
SPATIAL DISTRIBUTION



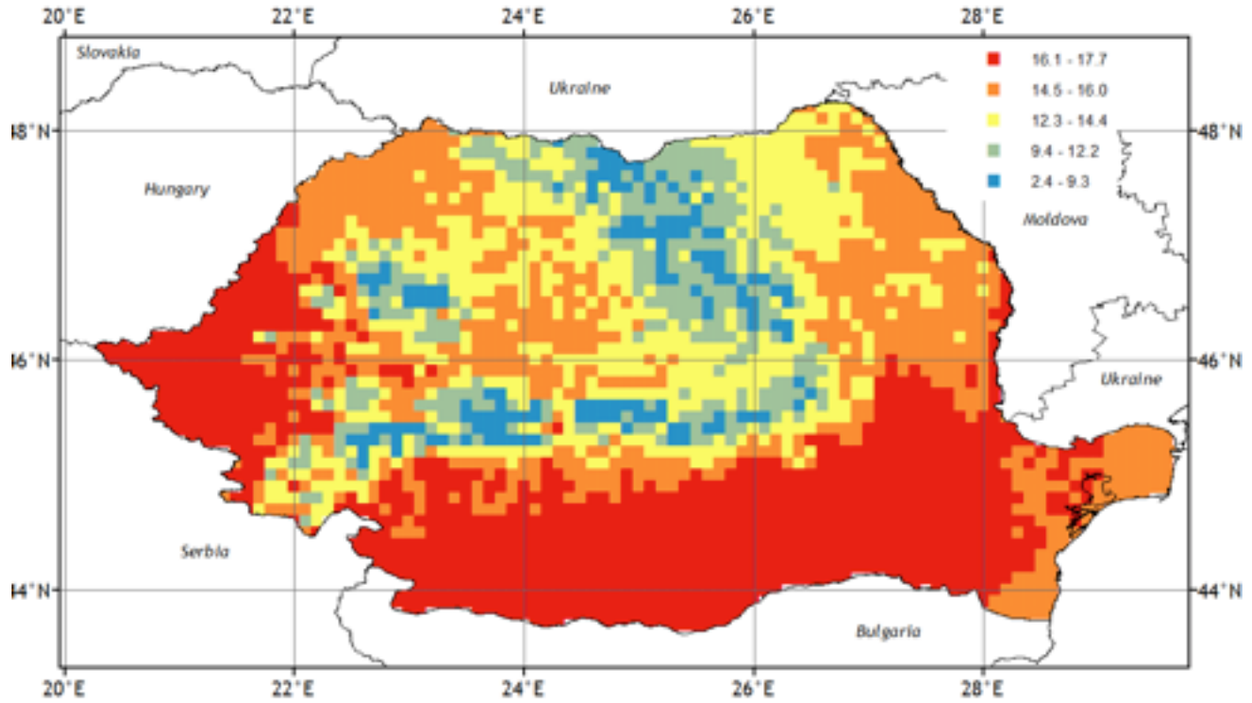
VERTICAL DISTRIBUTION



Tmin

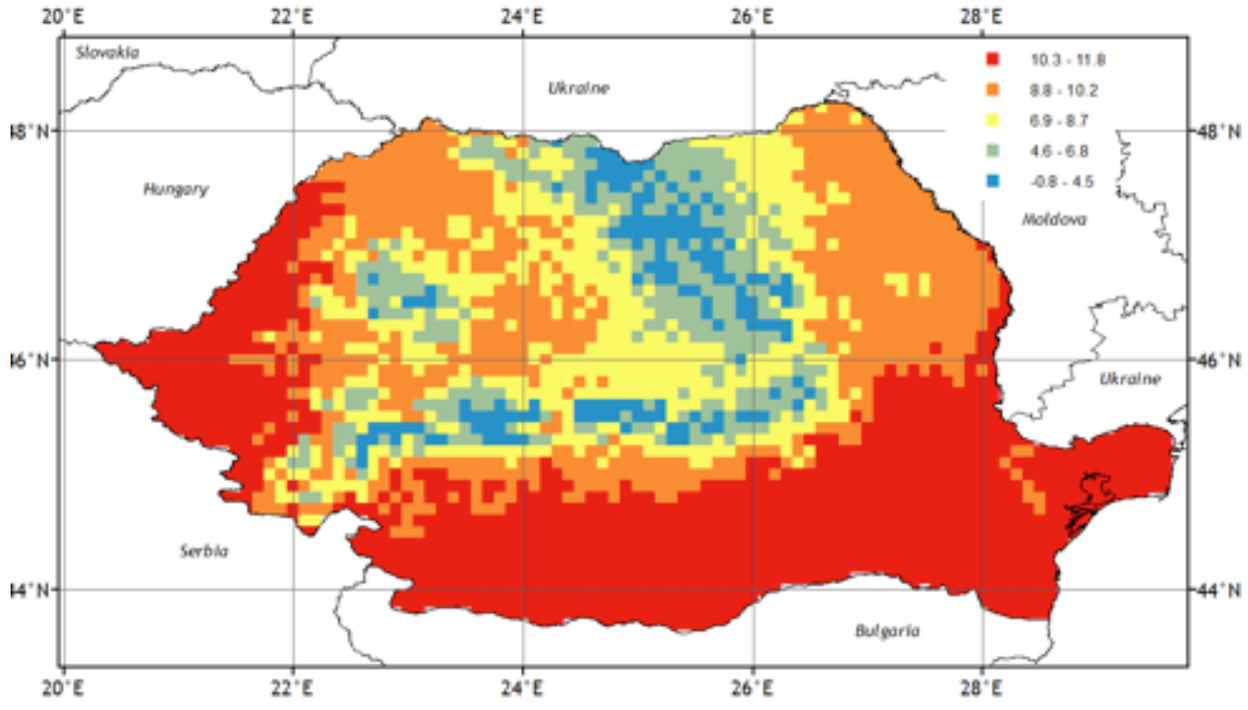


Tmax

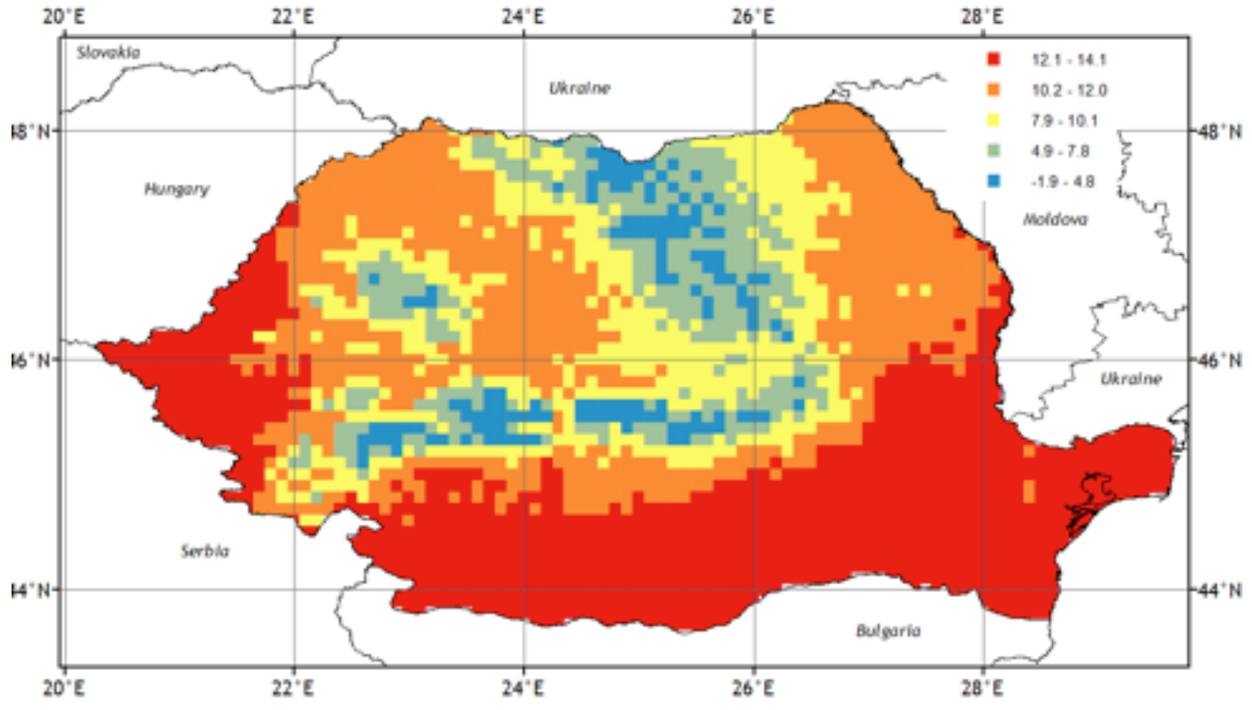


Multiannual means

Tmean

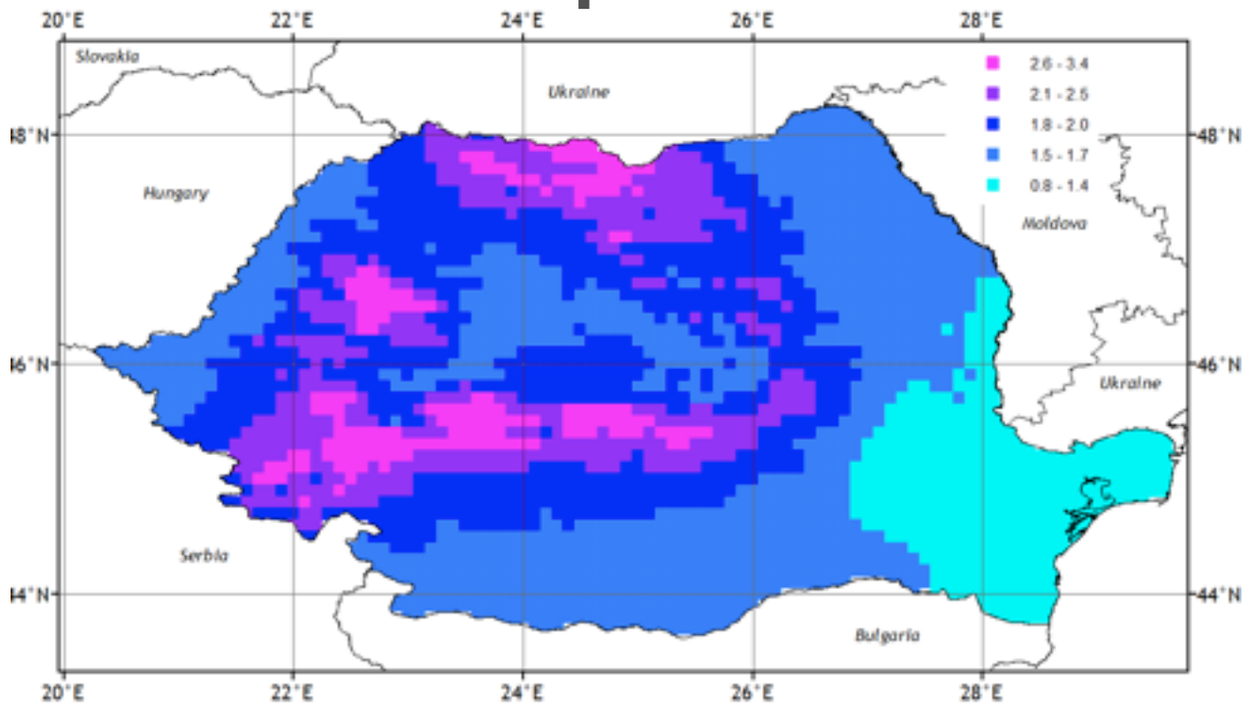


Tsoil

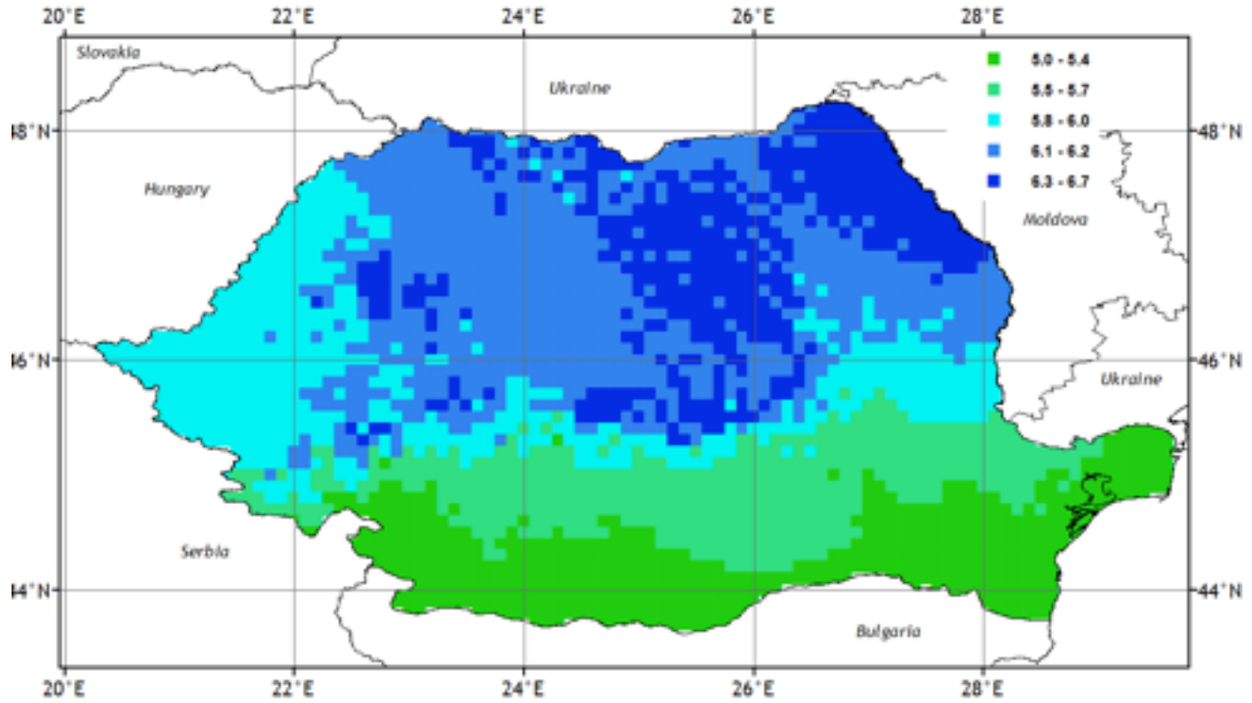


Multiannual means

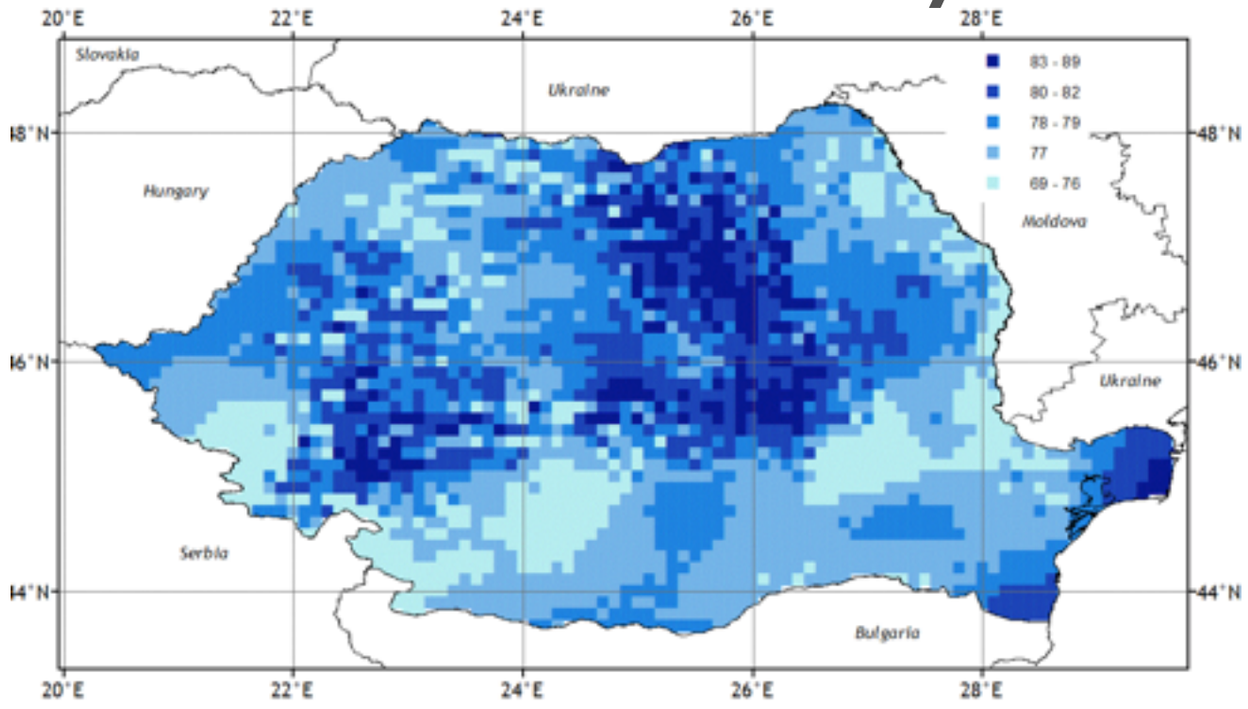
Precipitation



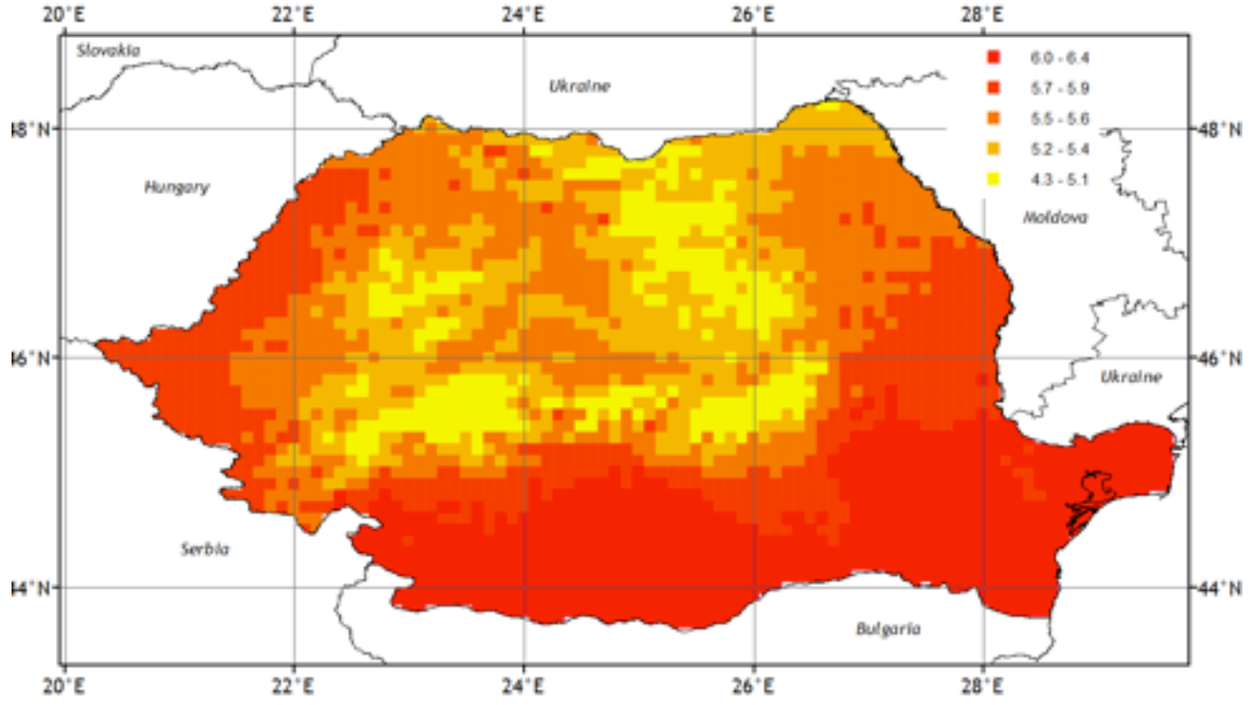
Cloud cover



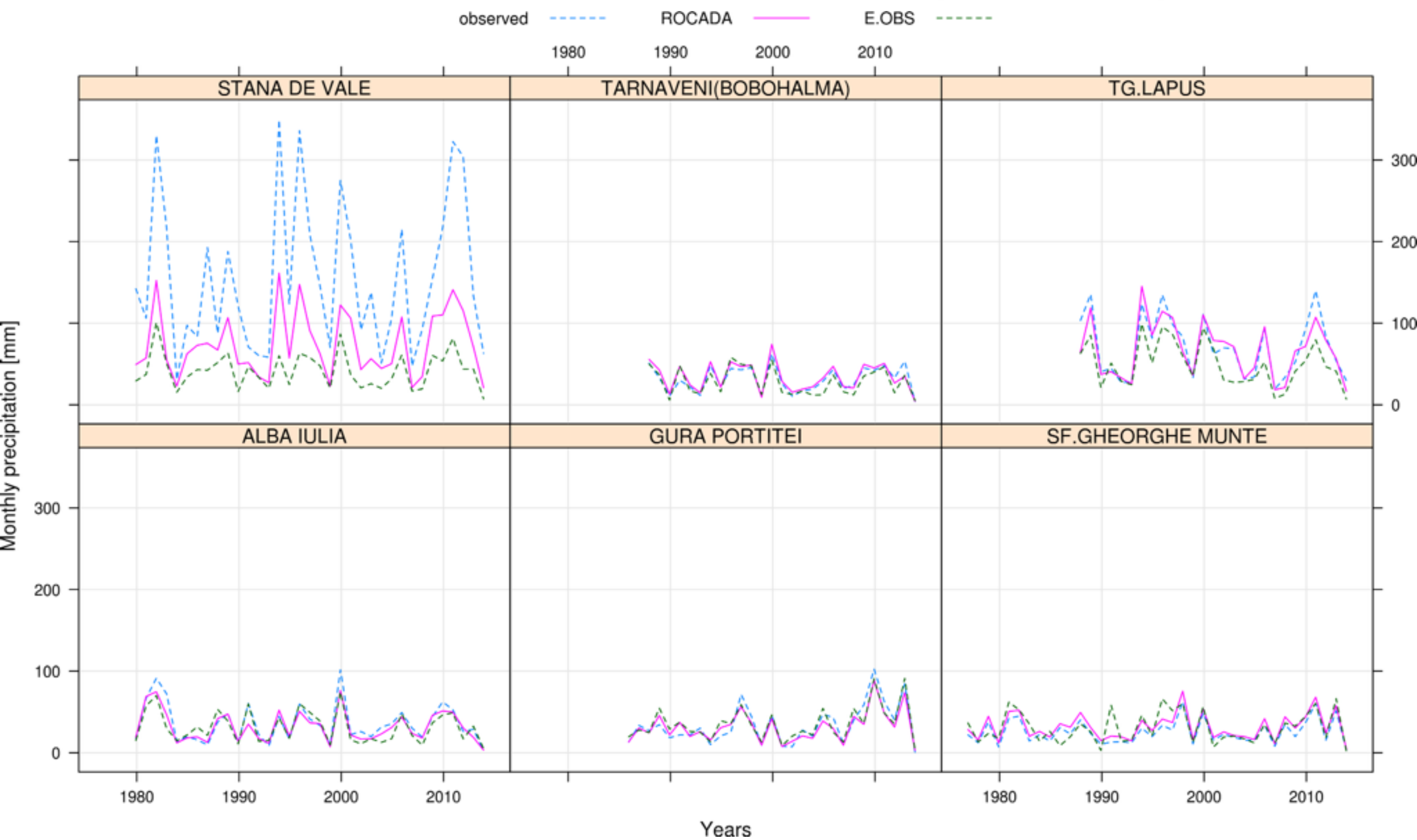
Relative humidity



Sunshine hours



PRECIPITATION (DEC.)



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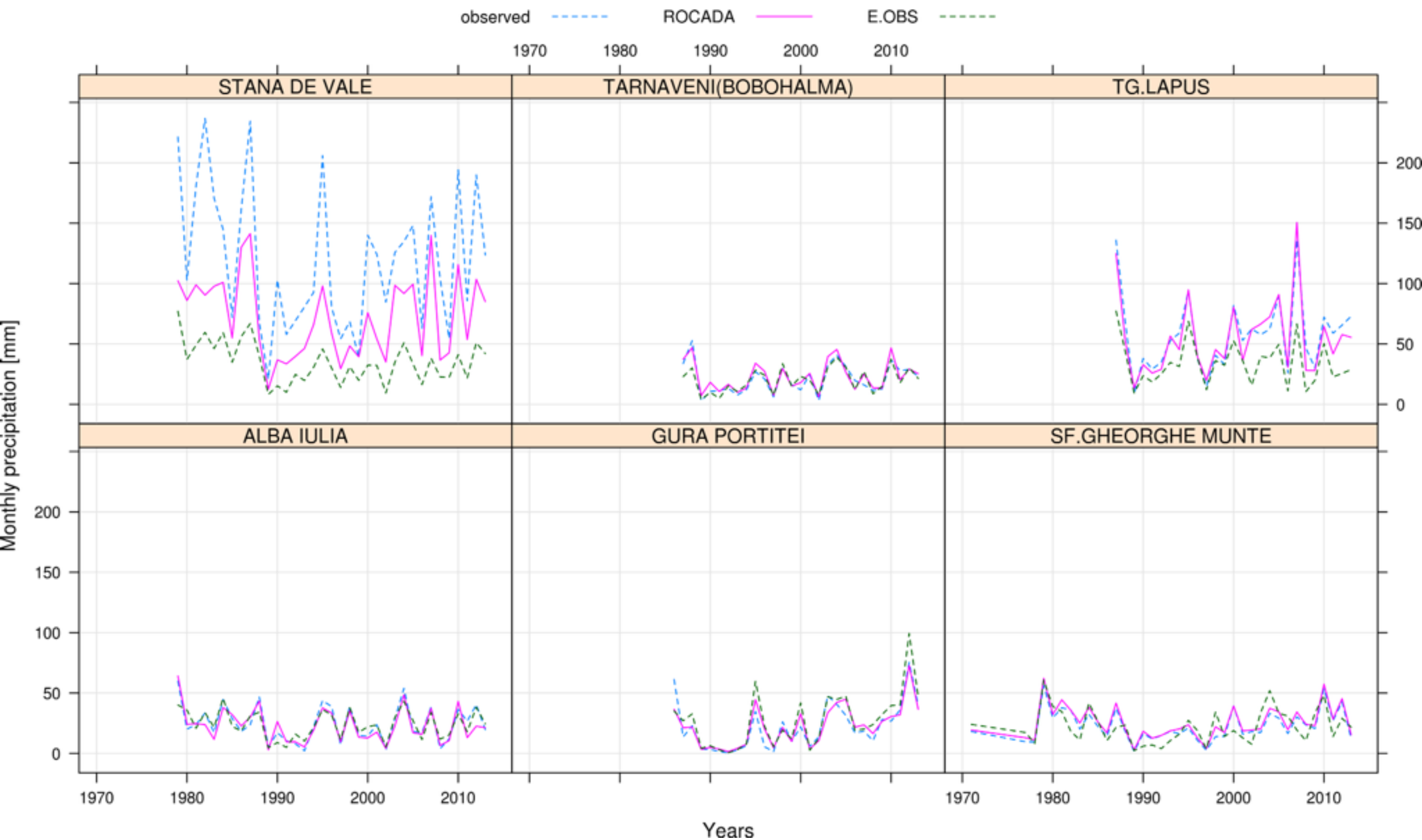

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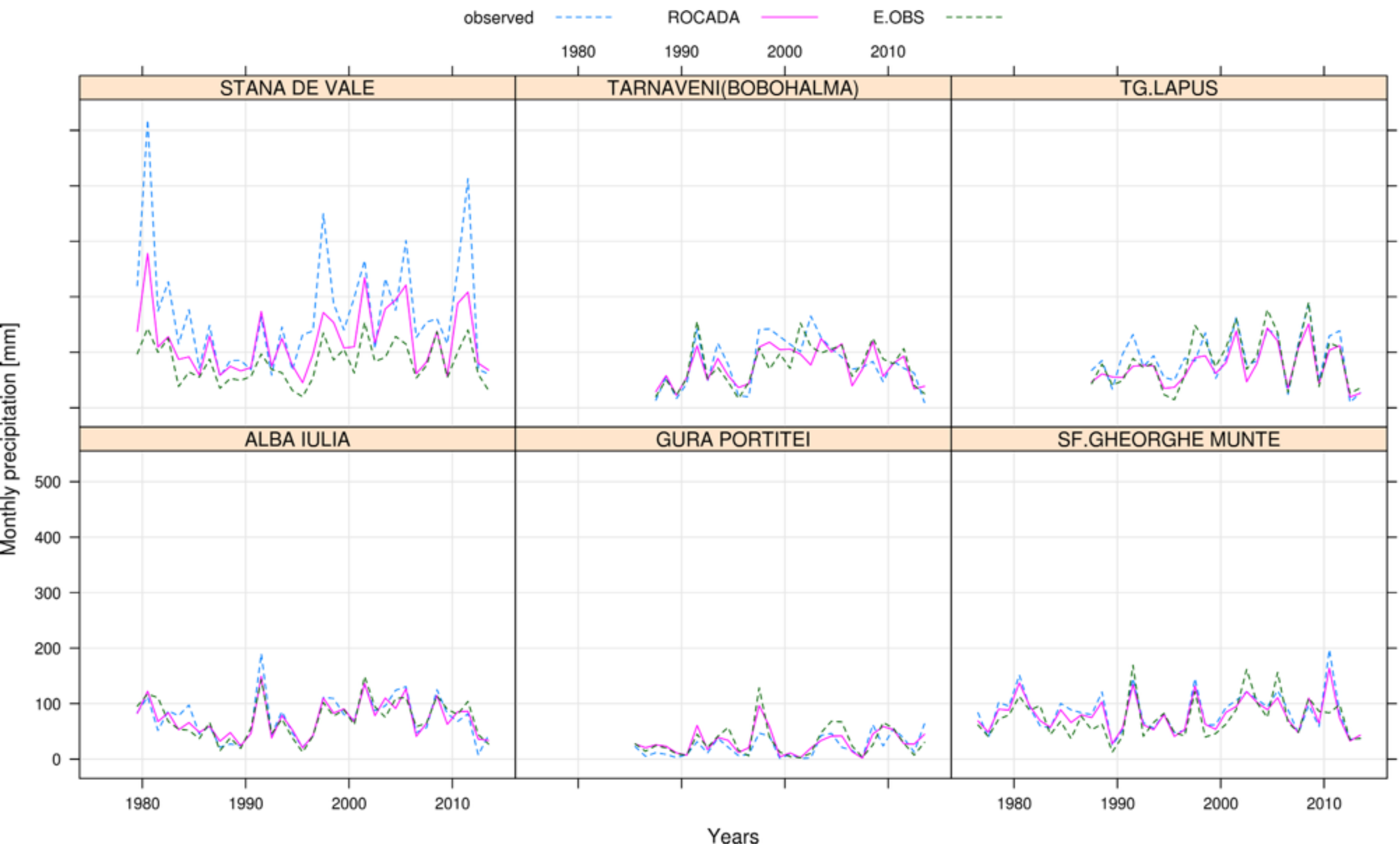
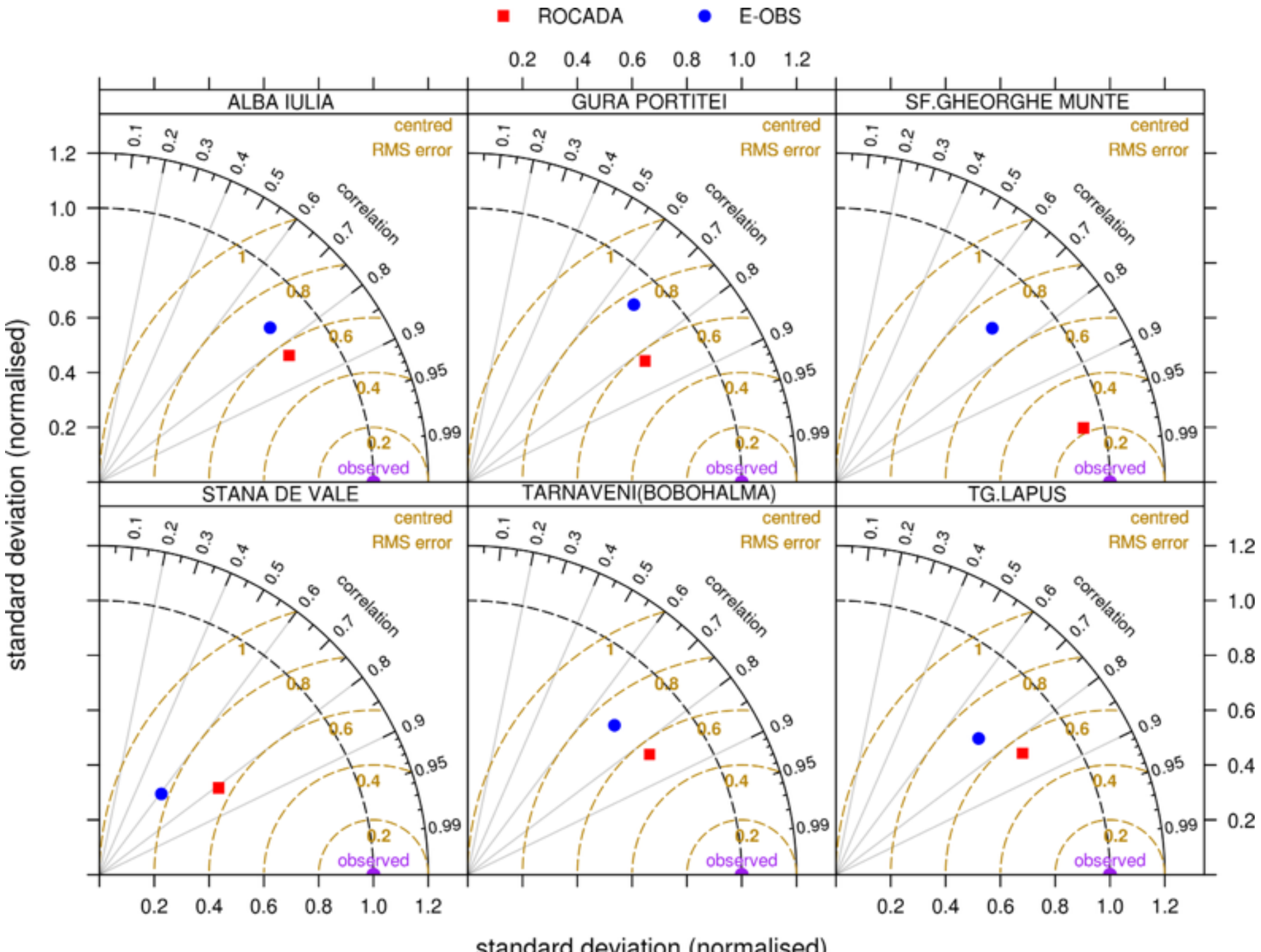
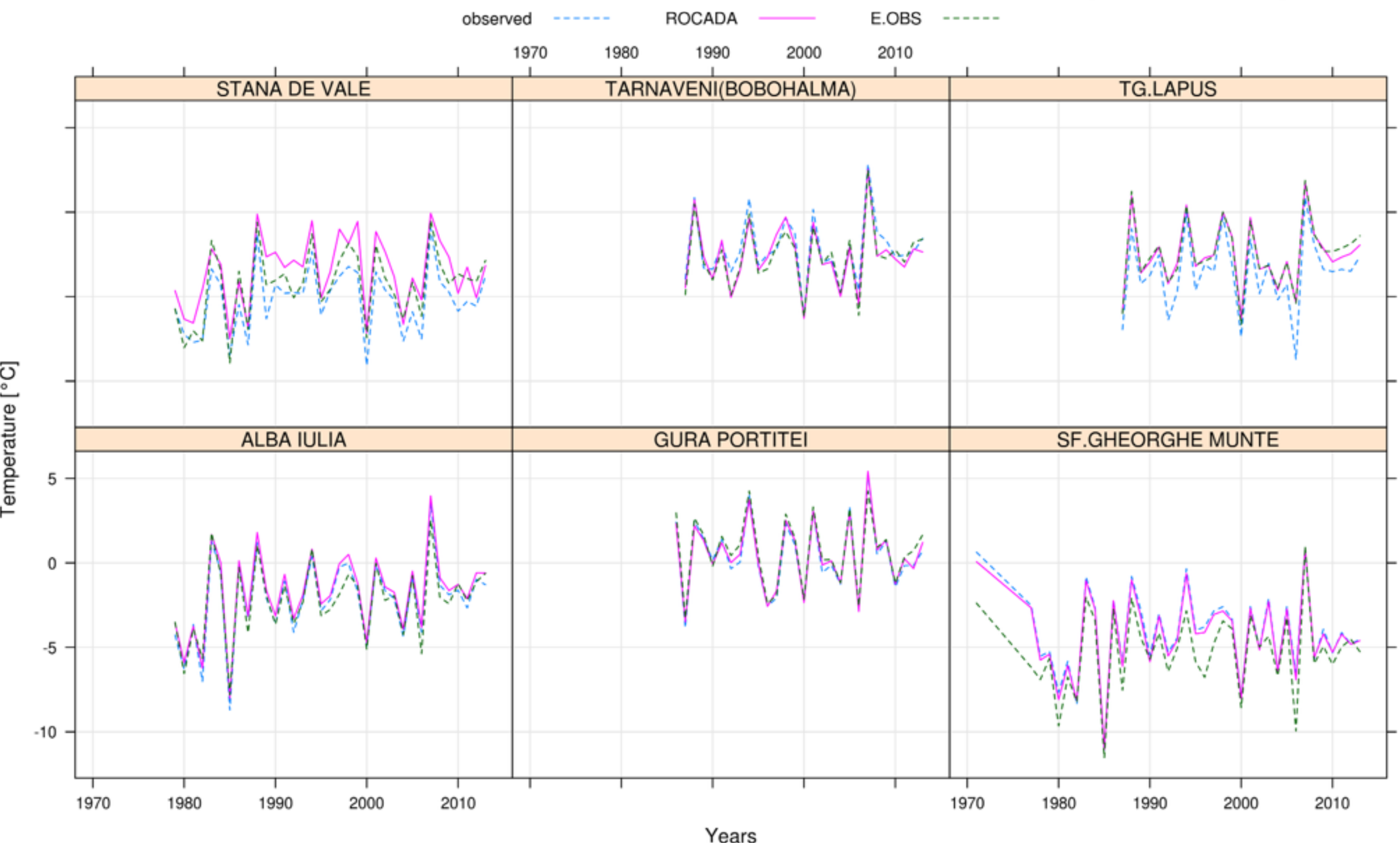


PRECIPITATION



MEAN TEMPERATURE (JAN.)



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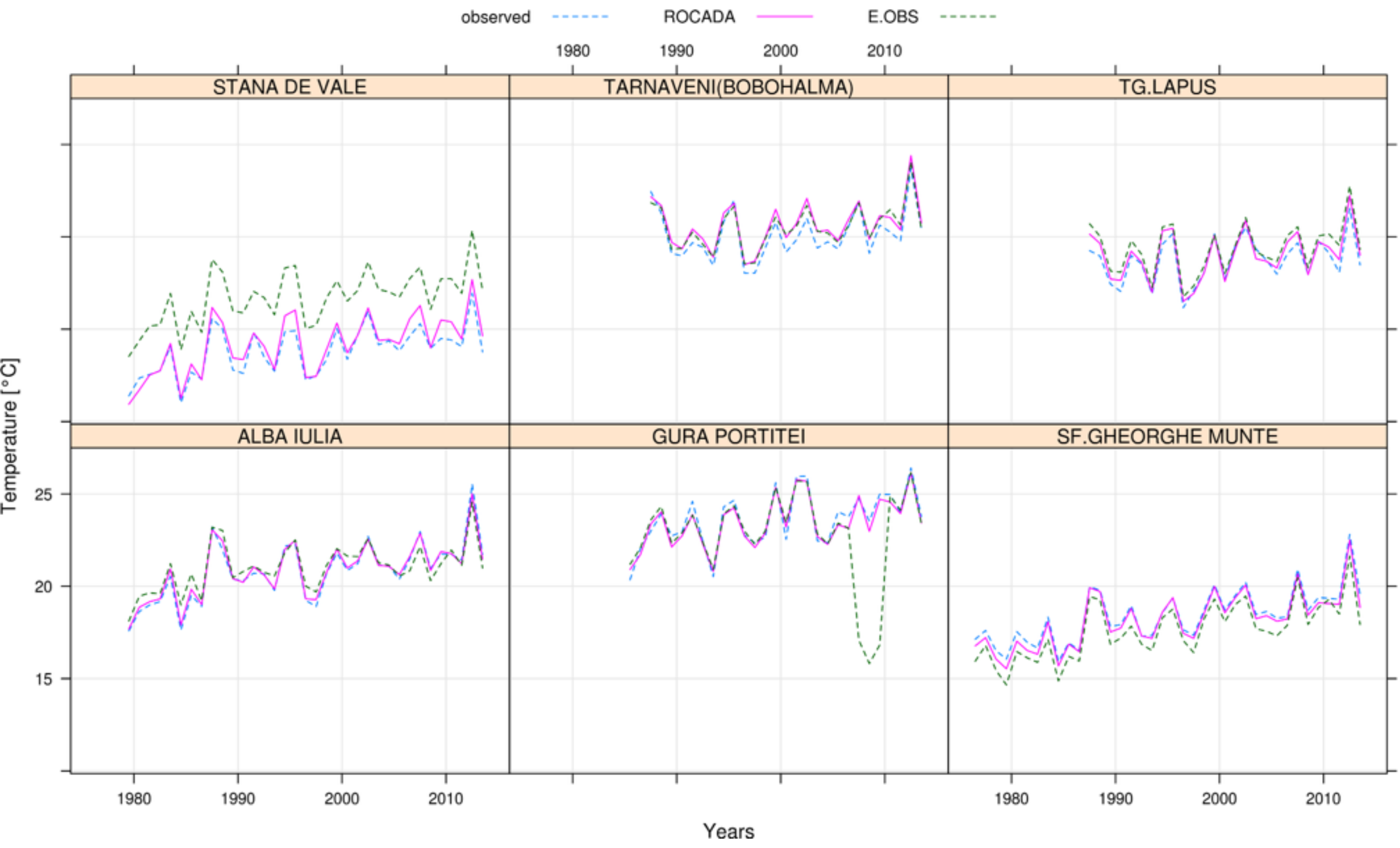
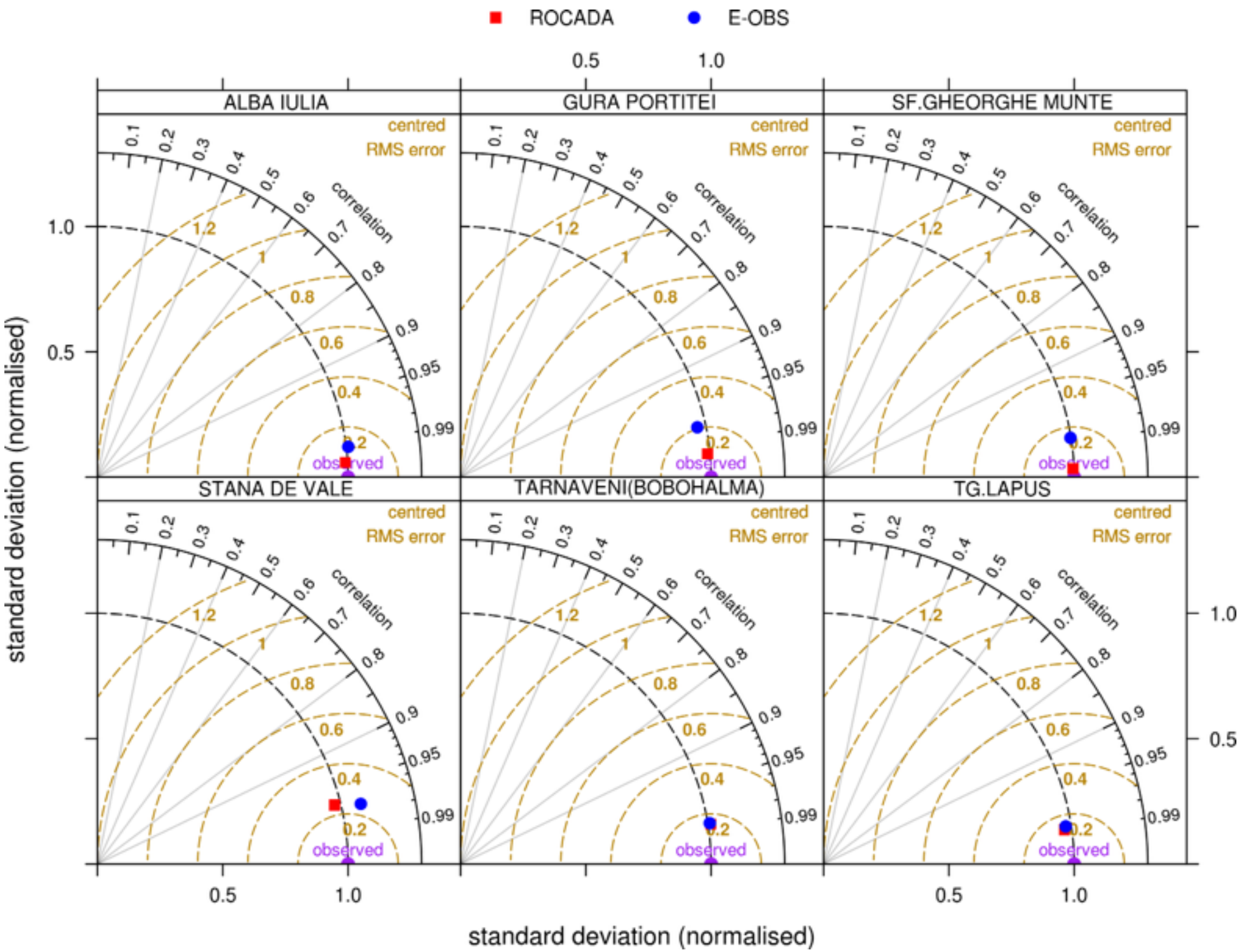
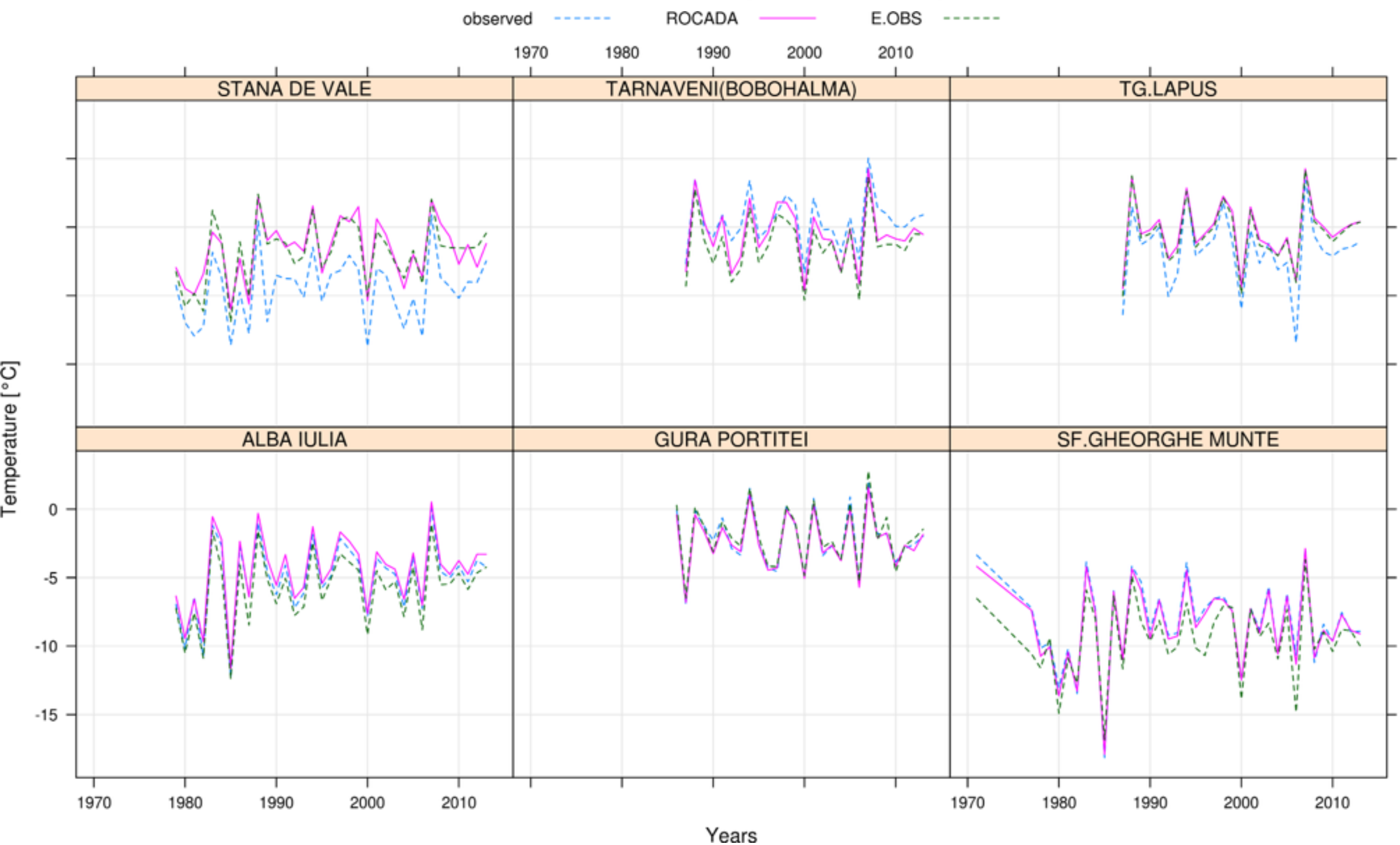


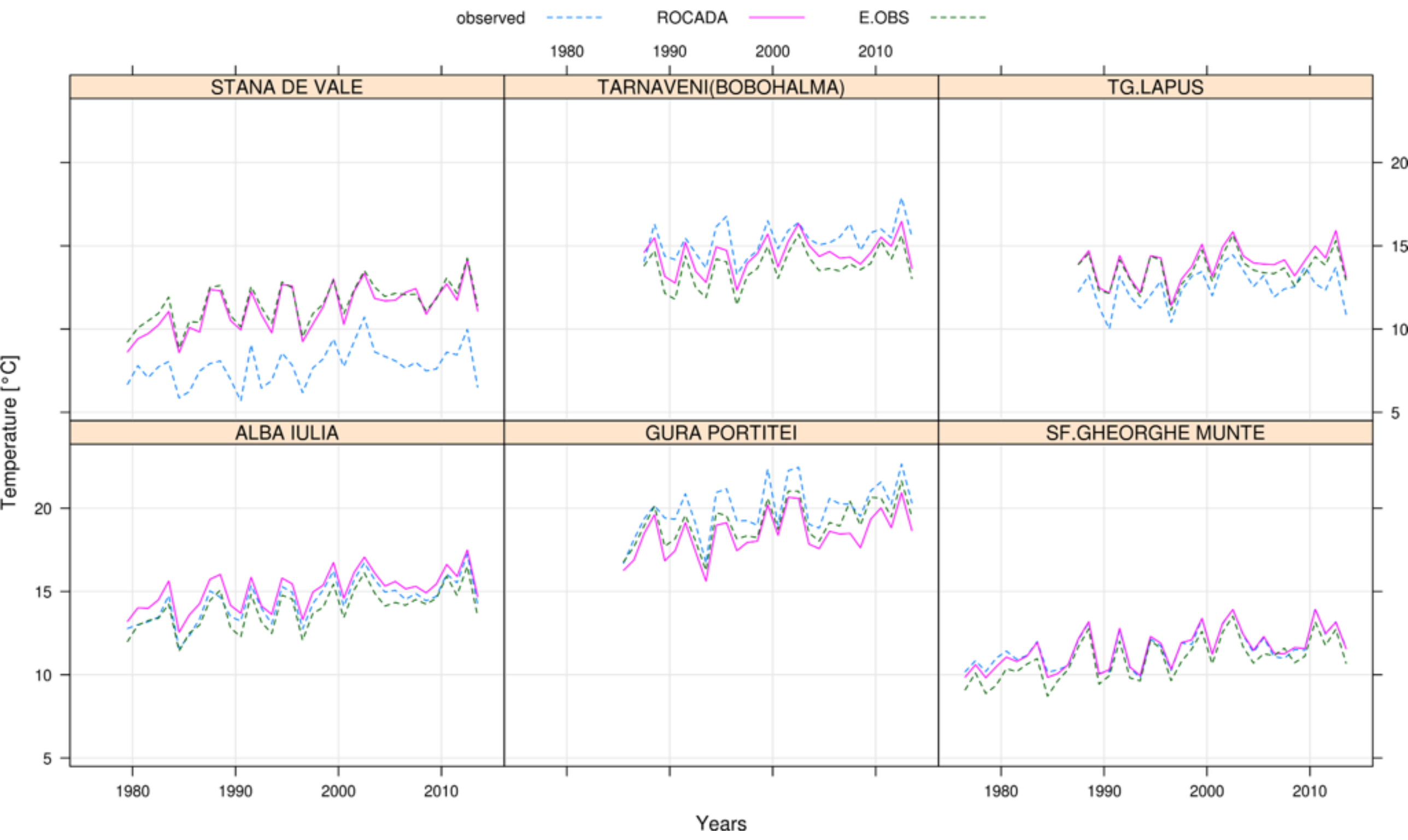
MEAN TEMPERATURE



TMIN (JAN.)


observed
ROCADA
E.OBS
1970
1980
1990
2000
2010
STANA DE VALE
TARNAVENI(BOBOHALMA)
TG.LAPUS
ALBA IULIA
GURA PORTITEI
SF.GHEORGHE MUNTE
Temperature [°C]
0
-5
-10
-15
Years

TMIN (JUL.)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STANA DE VALE
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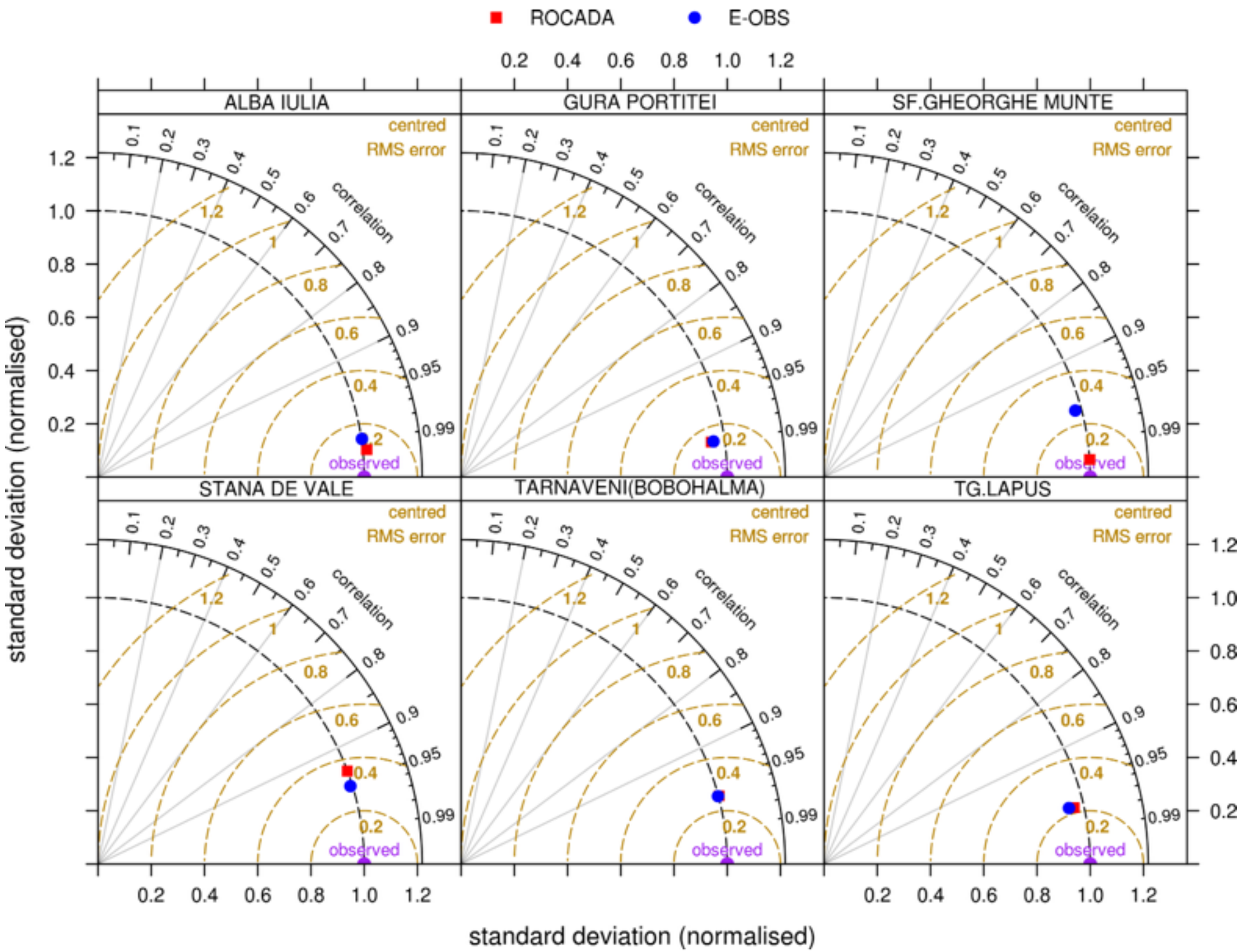
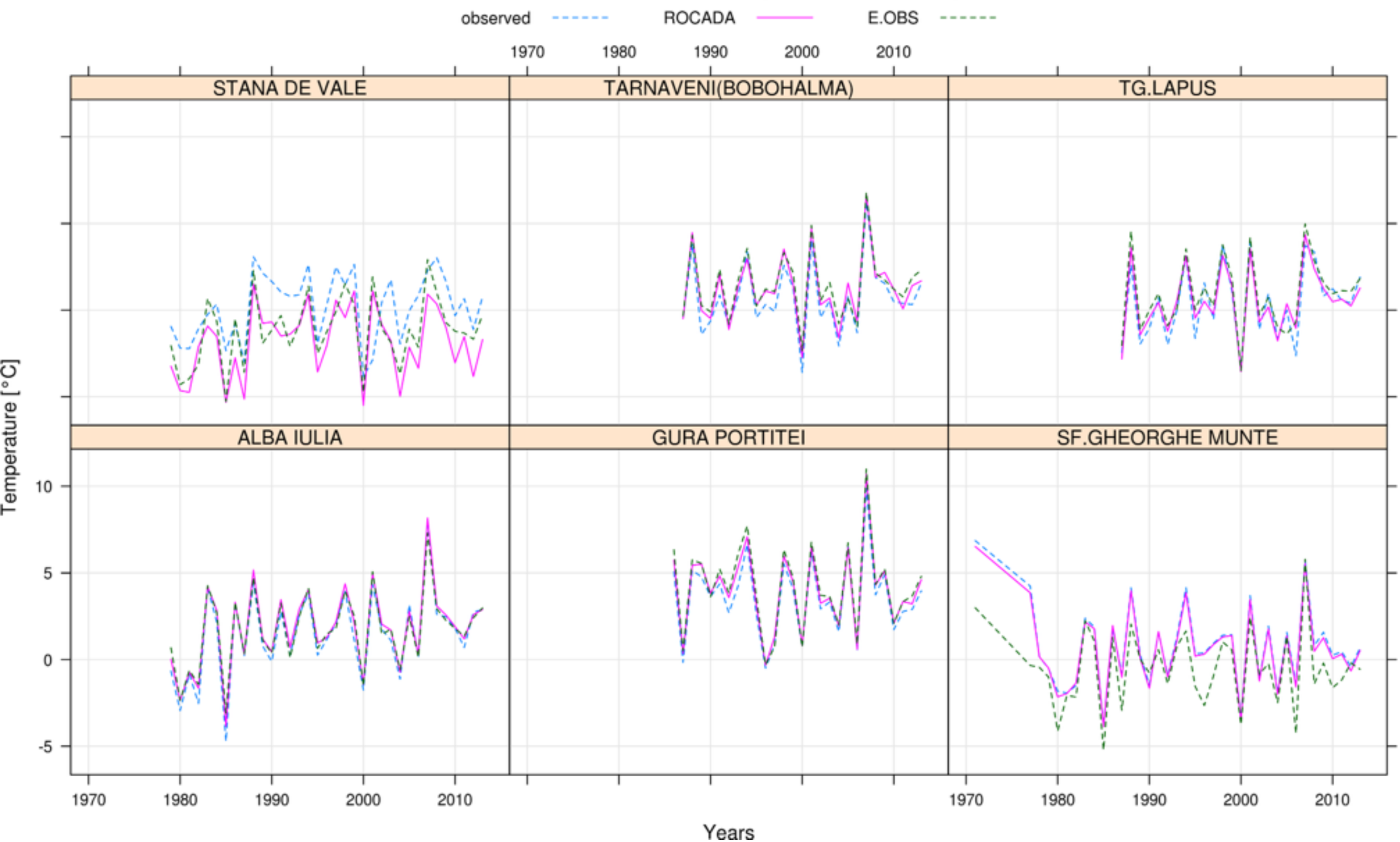
TG.LAPUS
ALBA IULIA
GURA PORTITEI
SF.GHEORGHE MUNTE
Temperature [°C]
Years
5
10
15
20

TMIN


ROCADA
E-OBS
ALBA IULIA
GURA PORTITEI
SF.GHEORGHE MUNTE
STANA DE VALE
TARNAVENI(BOBOHALMA)
TG.LAPUS
centred
RMS error
correlation
observed
standard deviation (normalised)
standard deviation (normalised)

TMAX (JAN.)


observed
ROCADA
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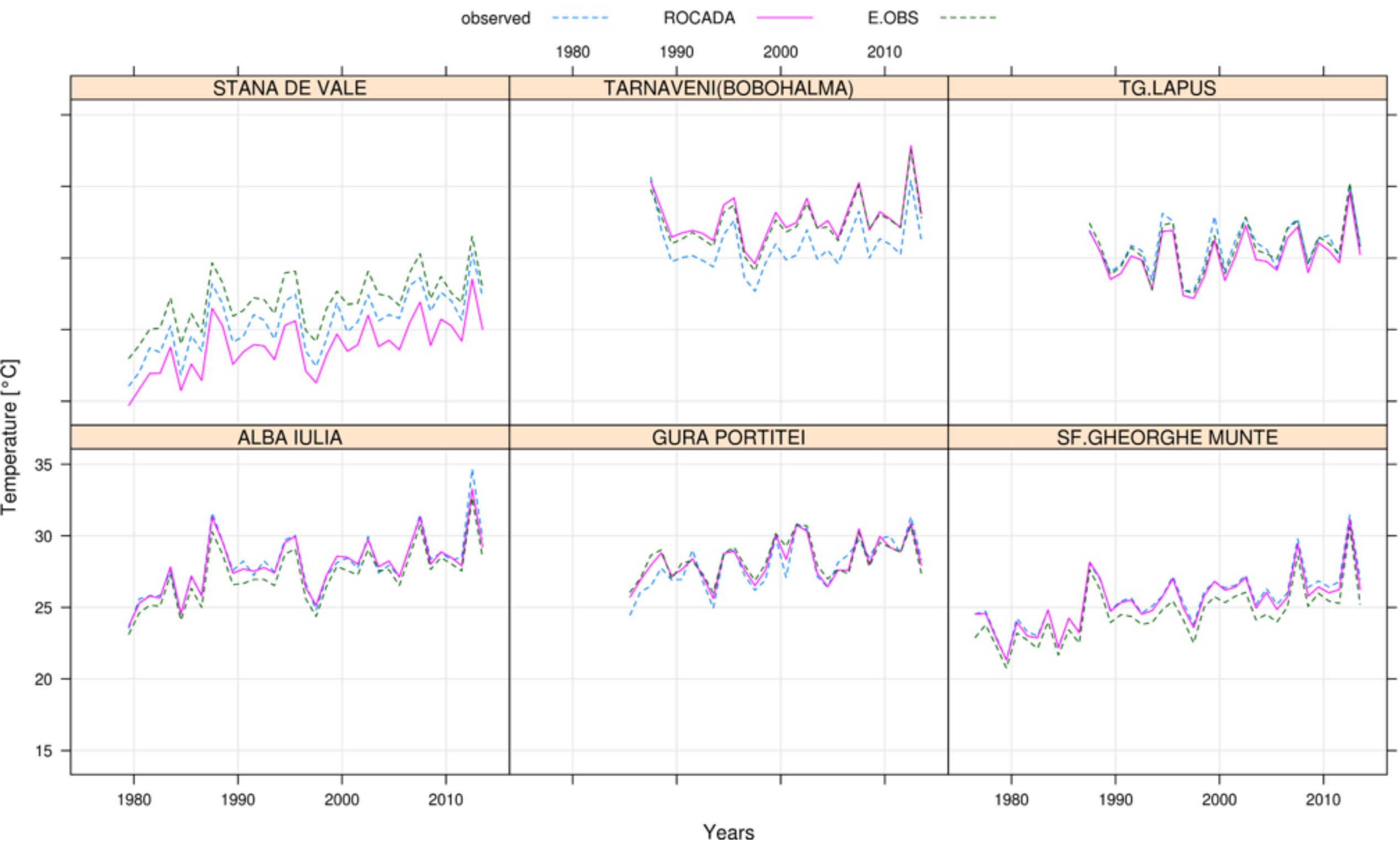
TG.LAPUS
ALBA IULIA
GURA PORTITEI
SF.GHEORGHE MUNTE
10
5
0
-5
Temperature [°C]
Years

TMAX (JUL.)


observed
ROCADA
E.OBS
1980
1990
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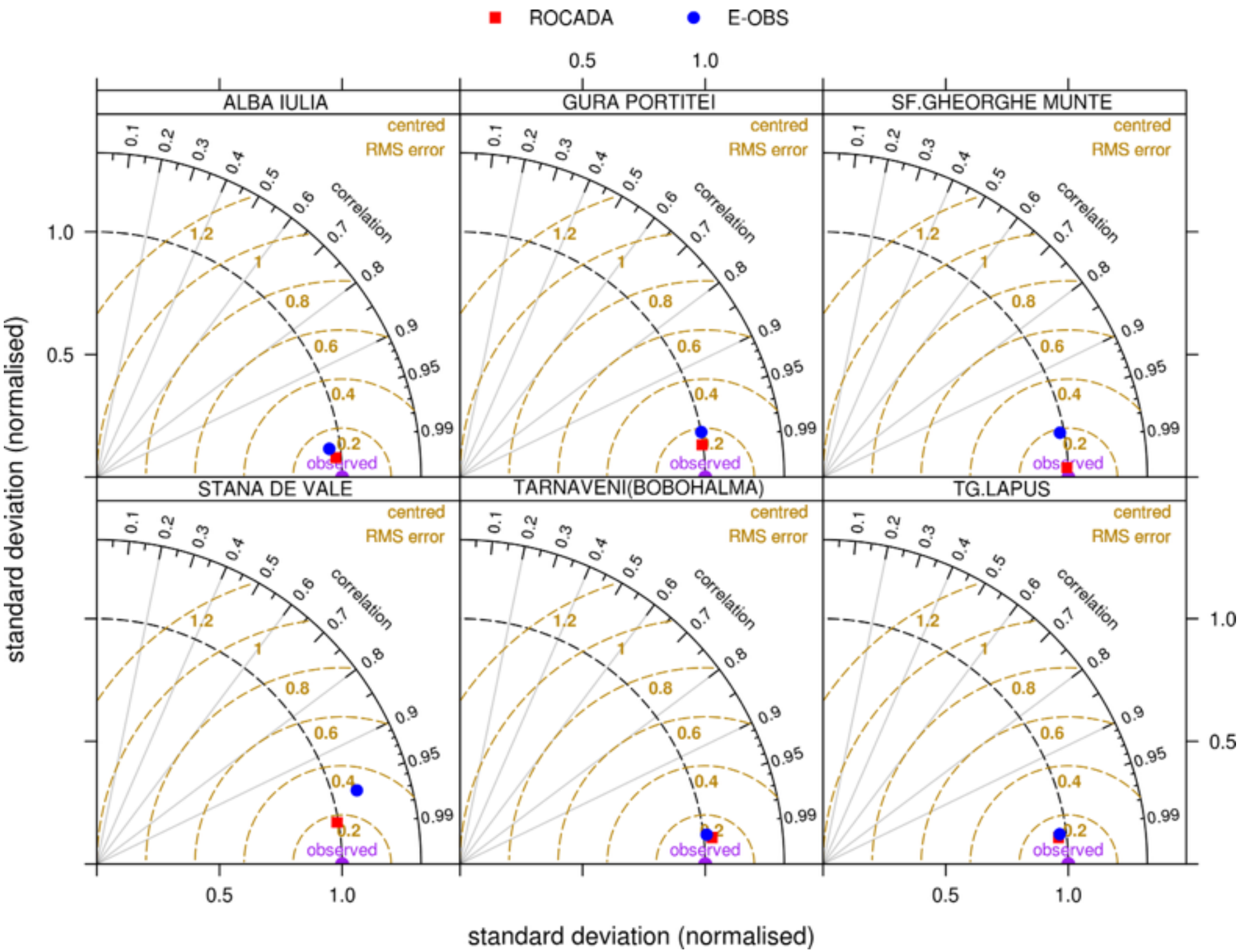
GURA PORTITEI
SF.GHEORGHE MUNTE
Temperature [°C]
Years

TMAX


ROCADA
E-OBS
ALBA IULIA
GURA PORTITEI
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STANA DE VALE
TARNAVENI(BOBOHALMA)
TG.LAPUS
centred
RMS error
correlation
observed
standard deviation (normalised)
standard deviation (normalised)

TRENDS IN ANNUAL EXTREMES (ETCCDI)

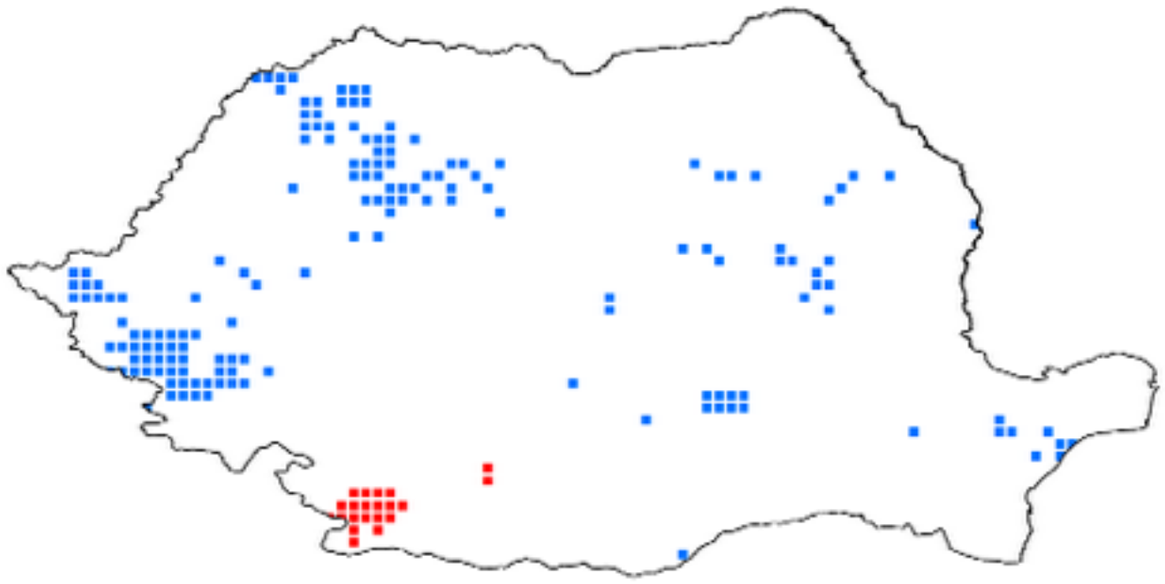
Mann-Kendall trend test

- applied to each pixel;

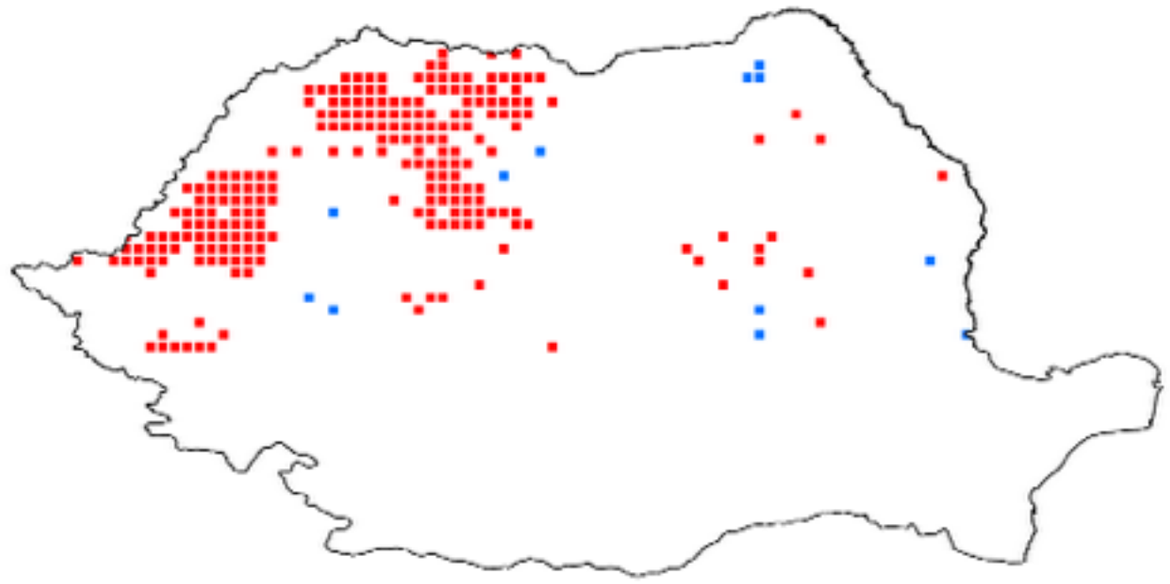
- 10% significance (two-tail test).

Legend: **increase** / **decrease**

Max length of dry spell

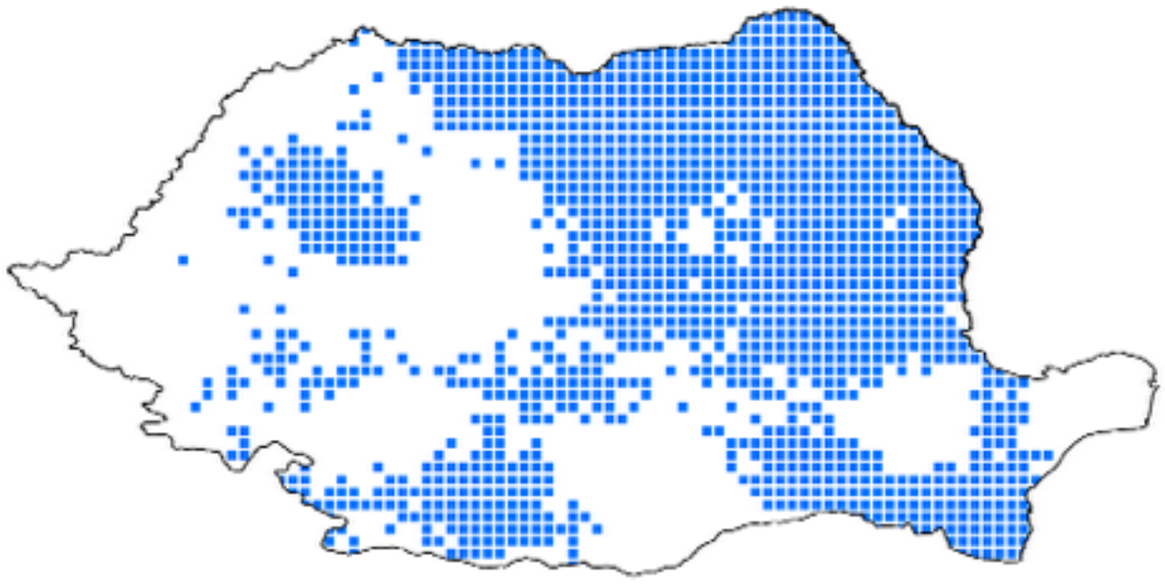


Max length of wet spell



Annual trends

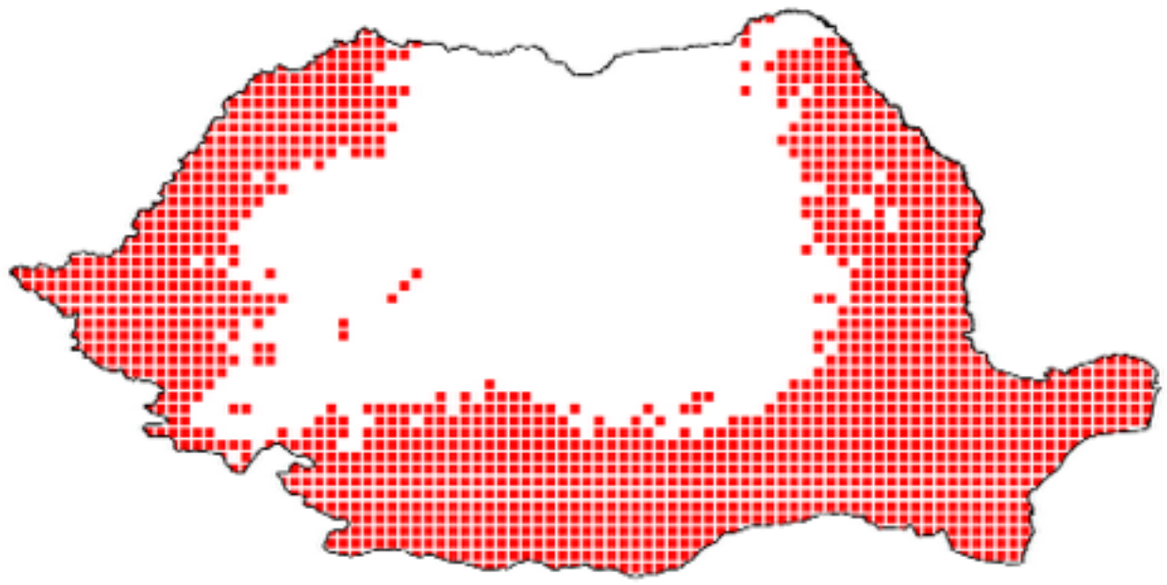
N° of frost days (Tmin<0)



N° of icing days (Tmax<0)

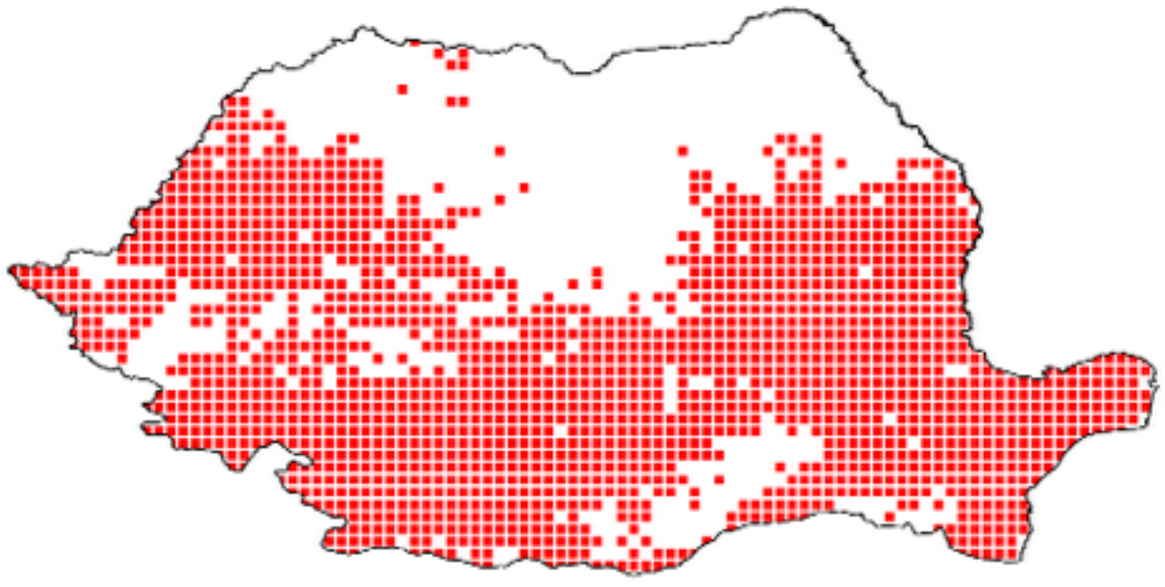
Summer days (Tmax>25°C)

Tropical nights (Tmin>20°C)

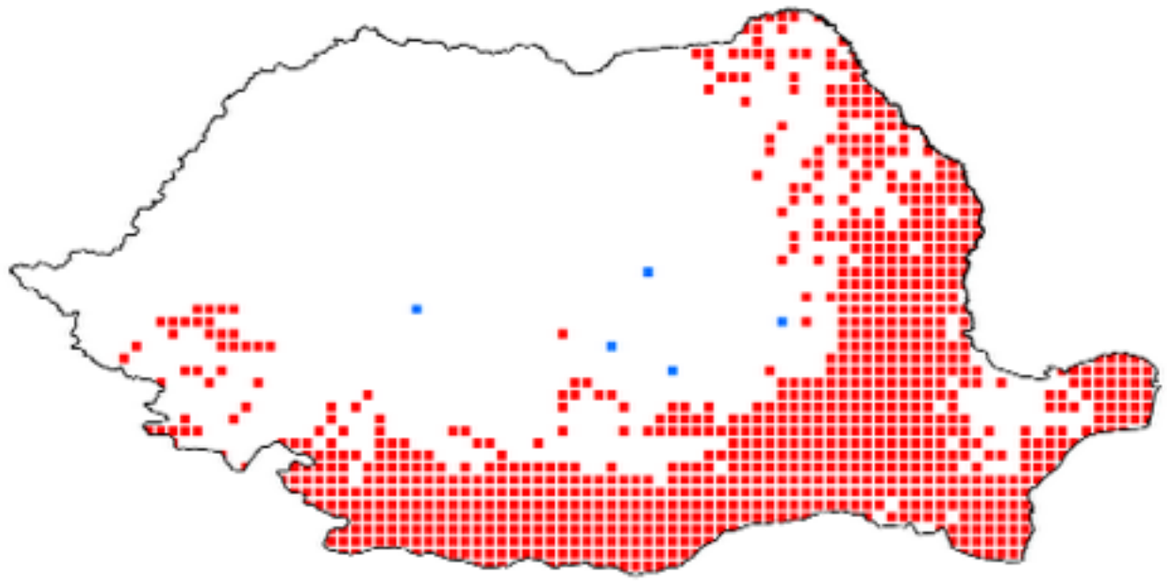


Annual trends

Warm spell duration index



Growing season length



CONCLUSIONS

MASH & MISH:

- State-of-the-art methodology;
- Reliable software;
- Fast (~8h on a previous generation MacBook Pro with WinXP as virtual machine);
- Easy to use.

FUTURE WORK

(1) Add metadata;

(2) Extend the period backwards;

(3) Increase the spatial resolution;

(4) Add more parameters: snow depth, wind speed, vapour pressure, evapotranspiration, solar radiation.

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THANKS

Dr Tamas Szentimrey

(disponibility)

UERRA EU-FP7: uerra.eu

(travel costs)