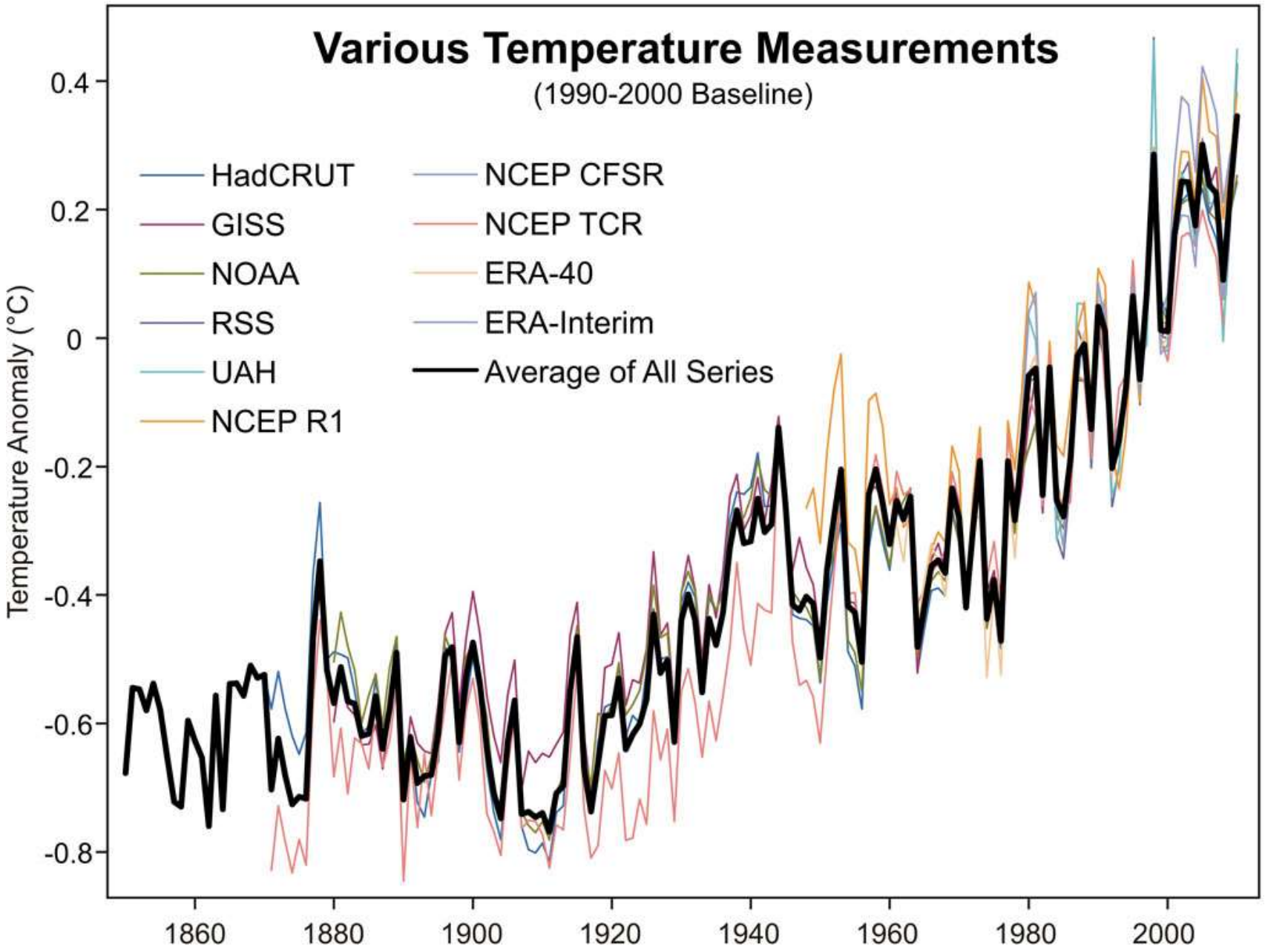
Nauka o klimatskim promenama – šta znamo o trendu porasta temperature

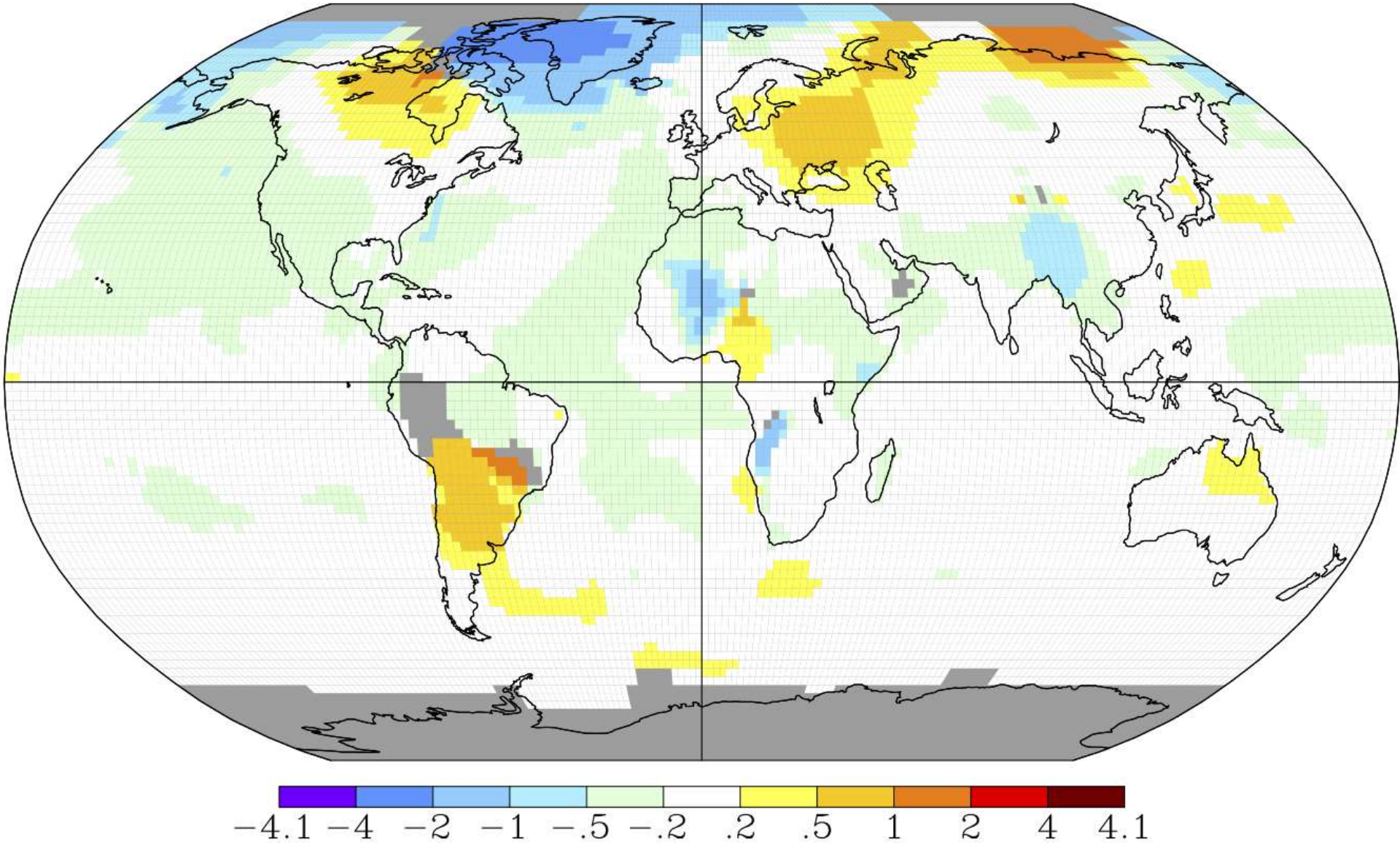
Vladimir Djurdjevic

Medijska radionica “Fokus na klimatske promene: razumevanje izazova – obaveštenost o rešenjima”, 25 novembar 2015, Beograd

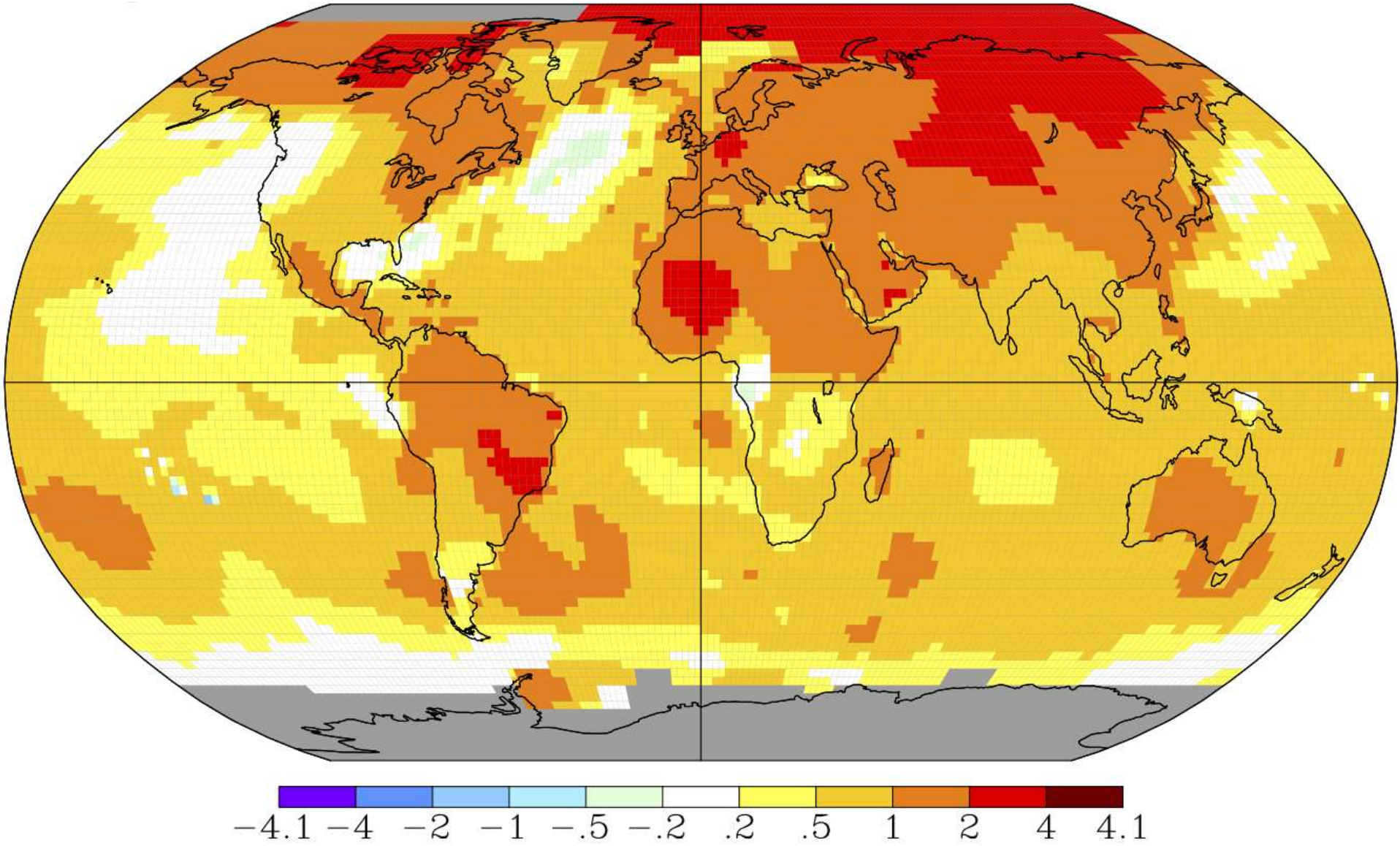

~14°C

Anomalija srednje globalne temperature od 1850. godine



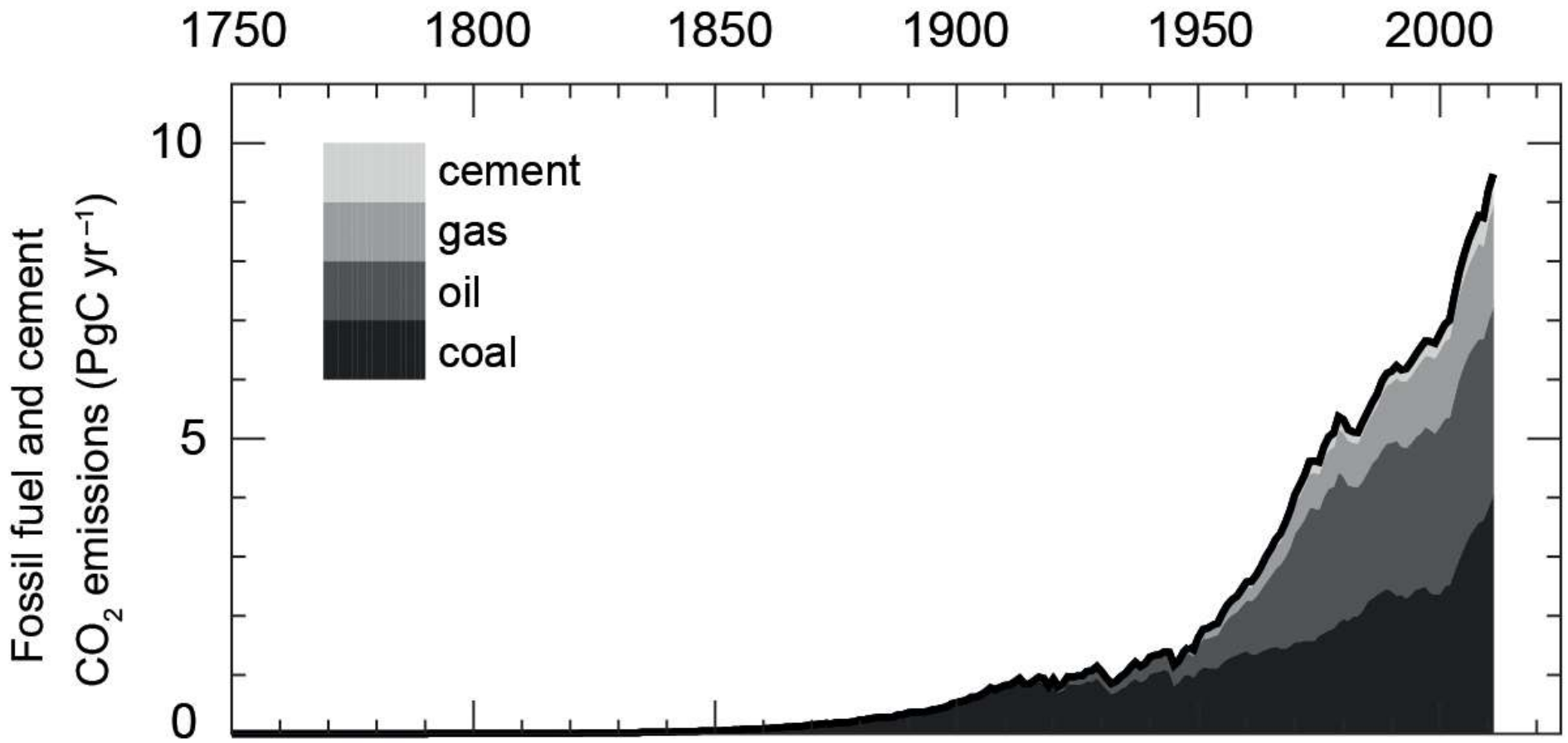


NASA-GISS data

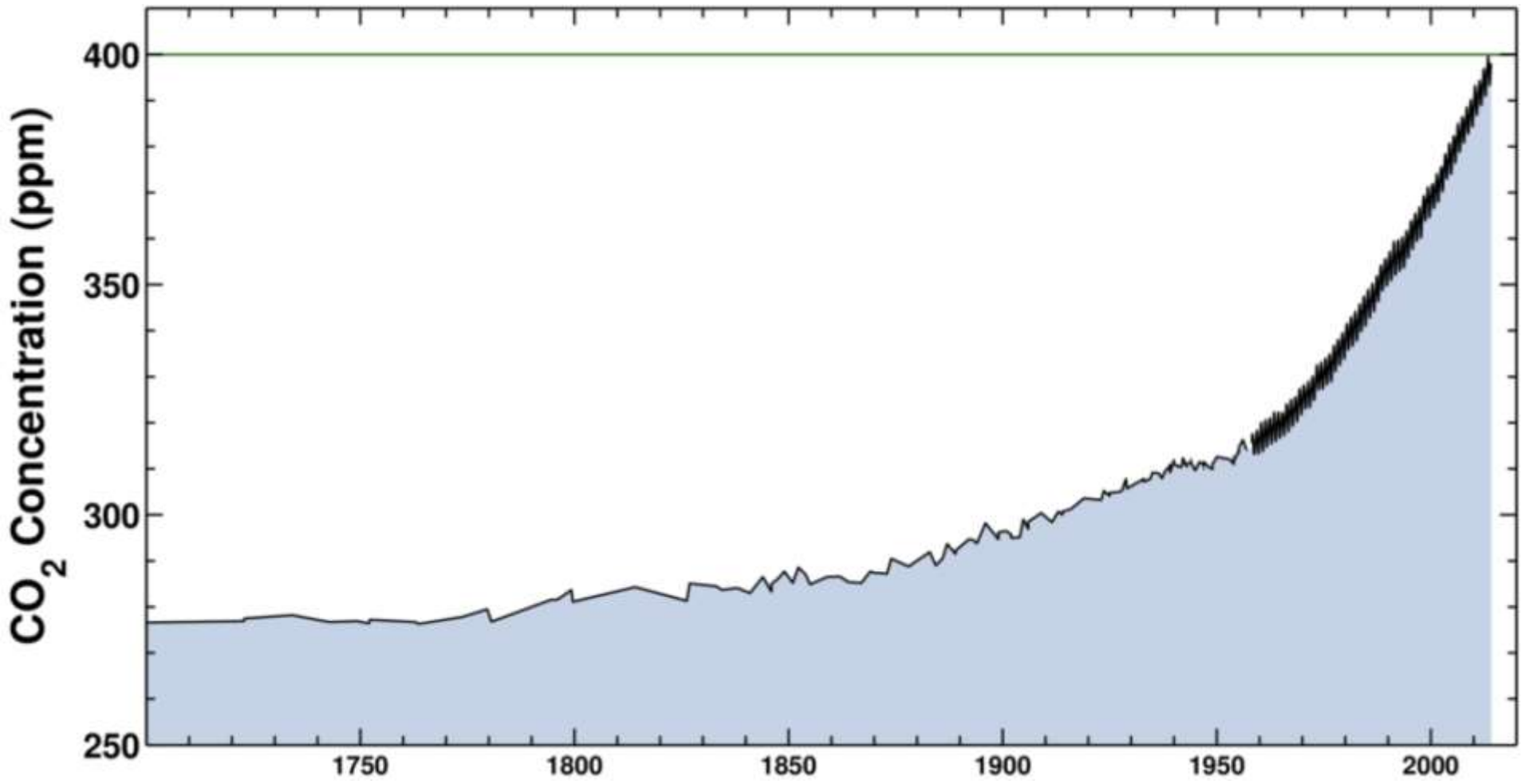


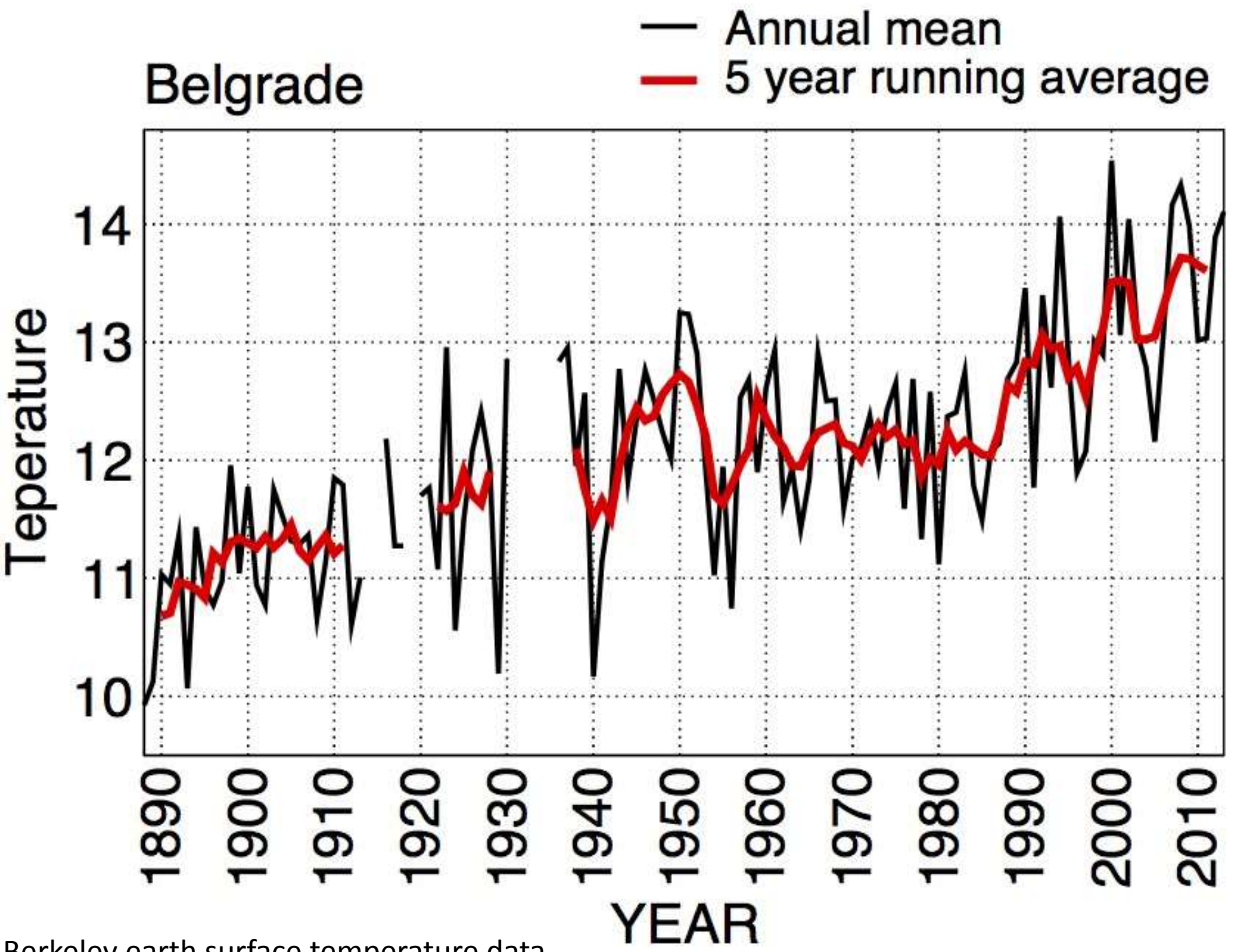
NASA-GISS data

Emisije gasova staklene bašte od 1750. godine



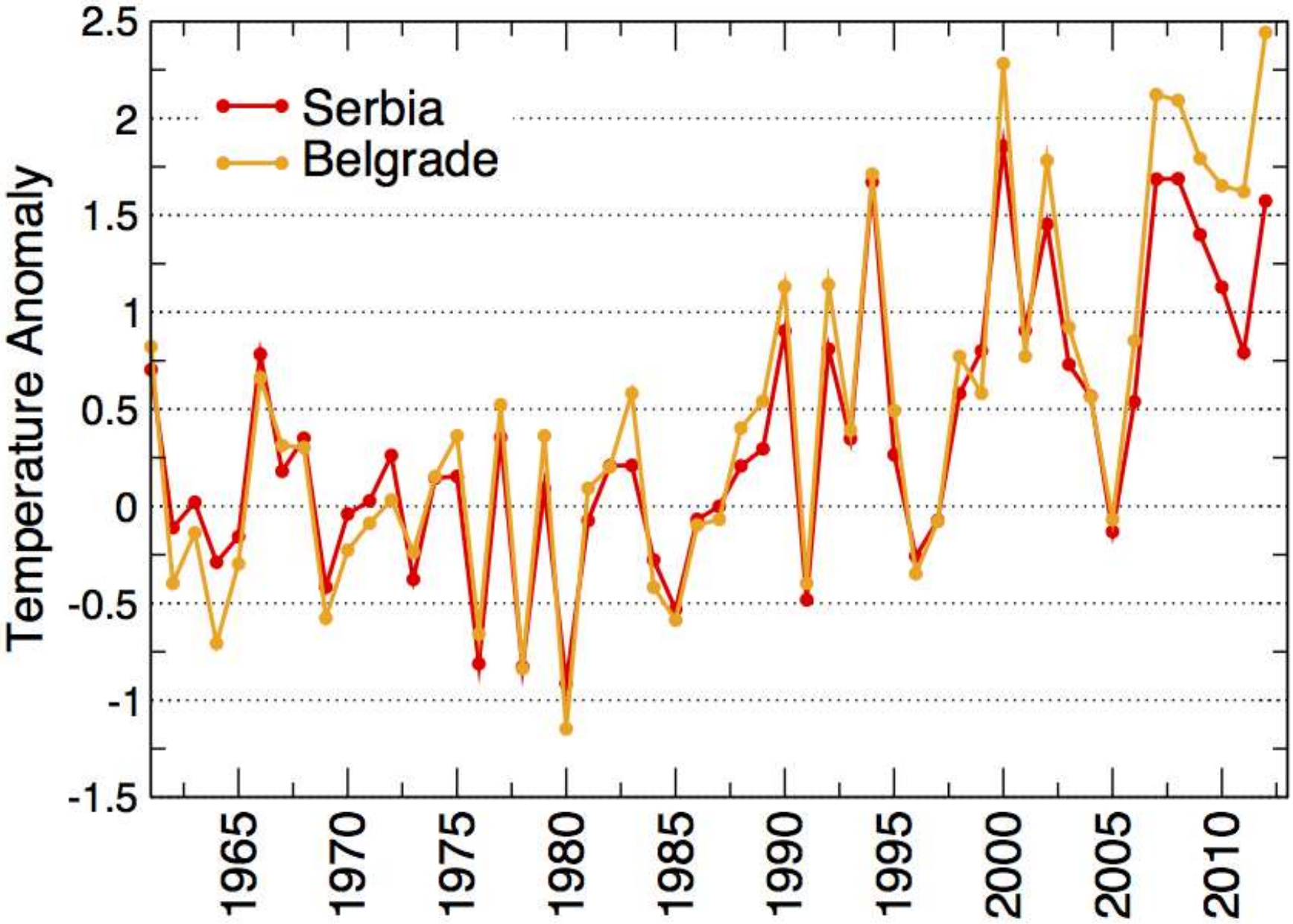
IPCC AR5



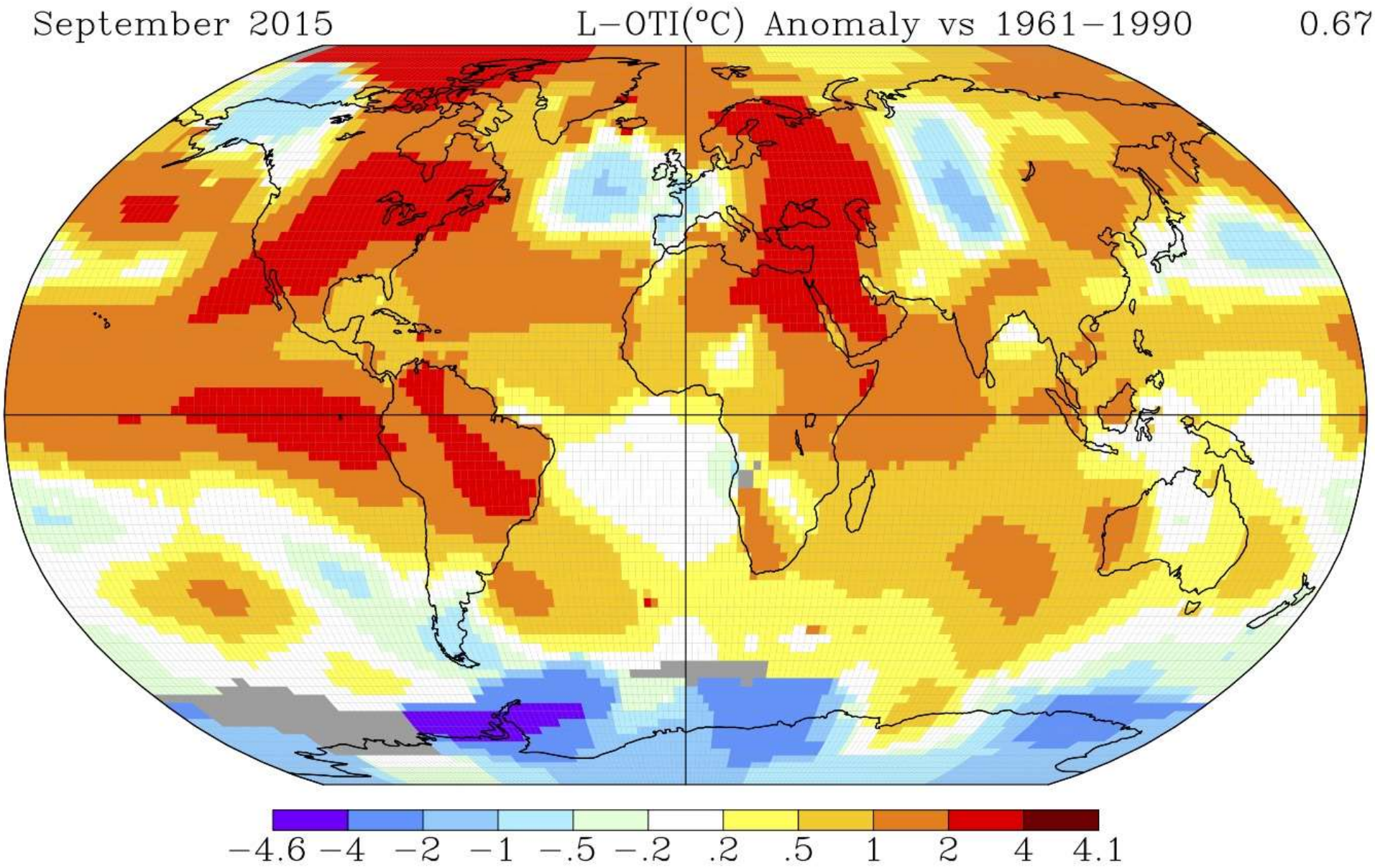


Berkeley earth surface temperature data

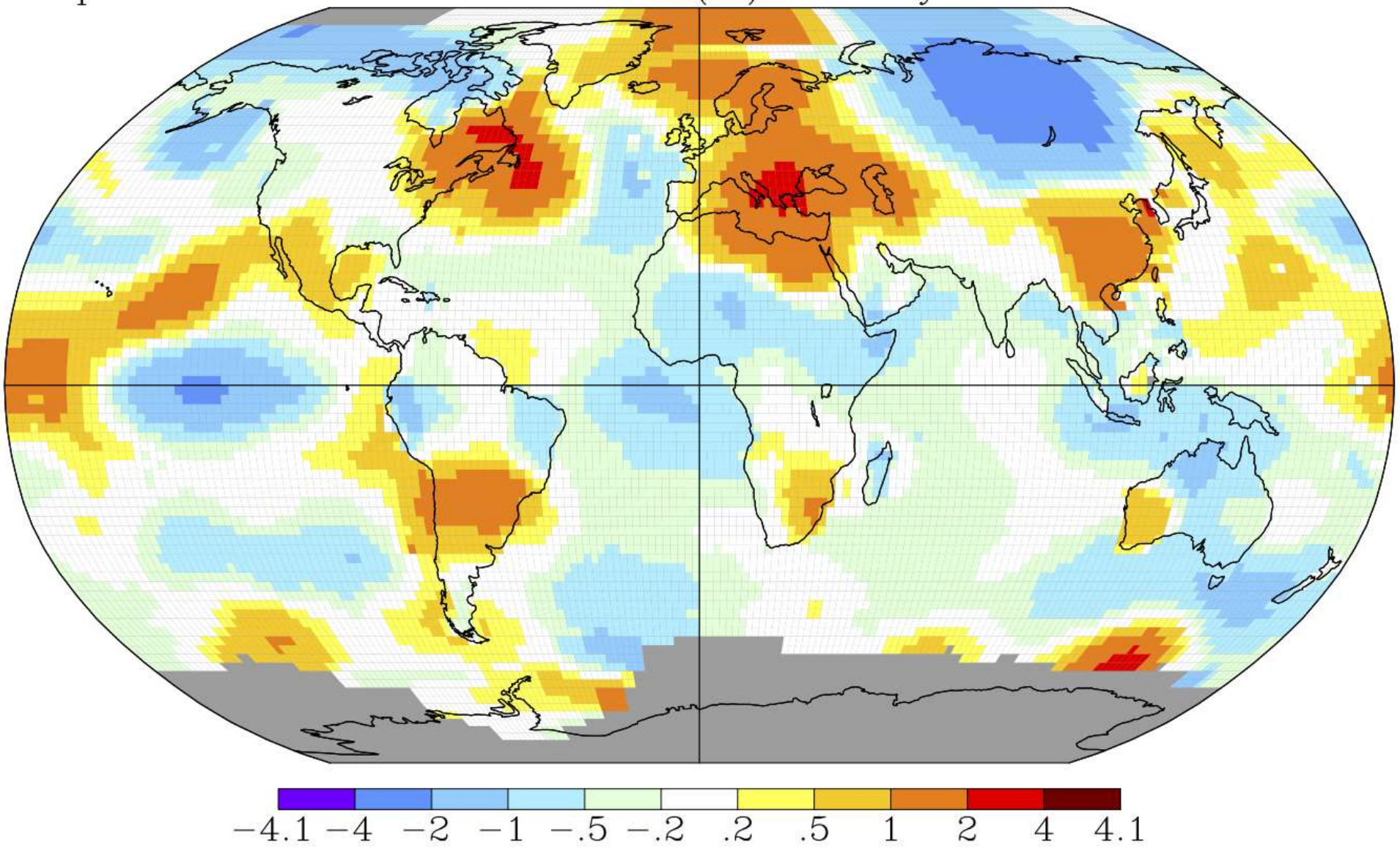
Trend porasta temperature ~0.3 ºC/dekadi



(data: RHMZS; Drugi nacionalni izveštaj prema UNFCCC)

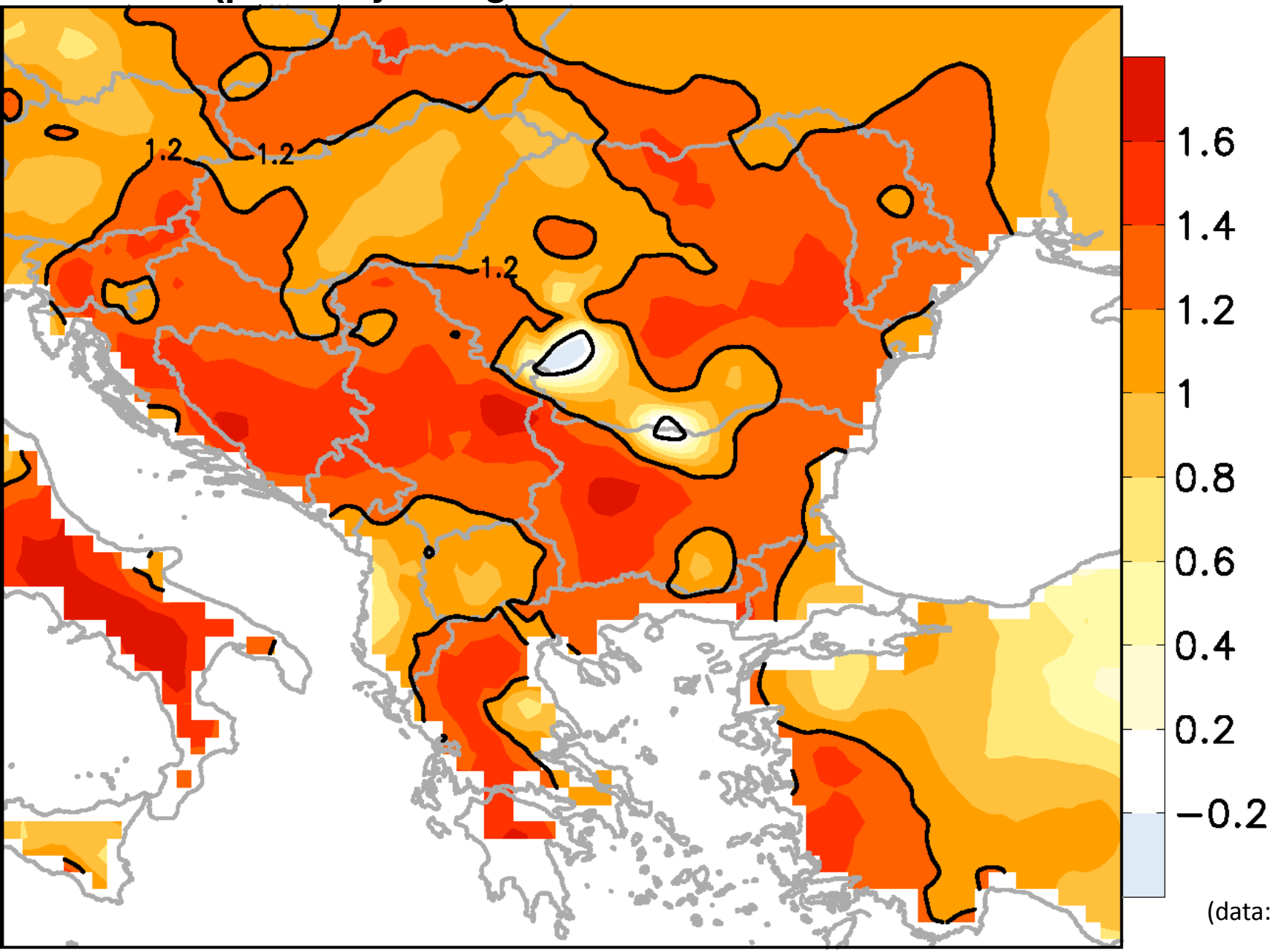


NASA-GISS data

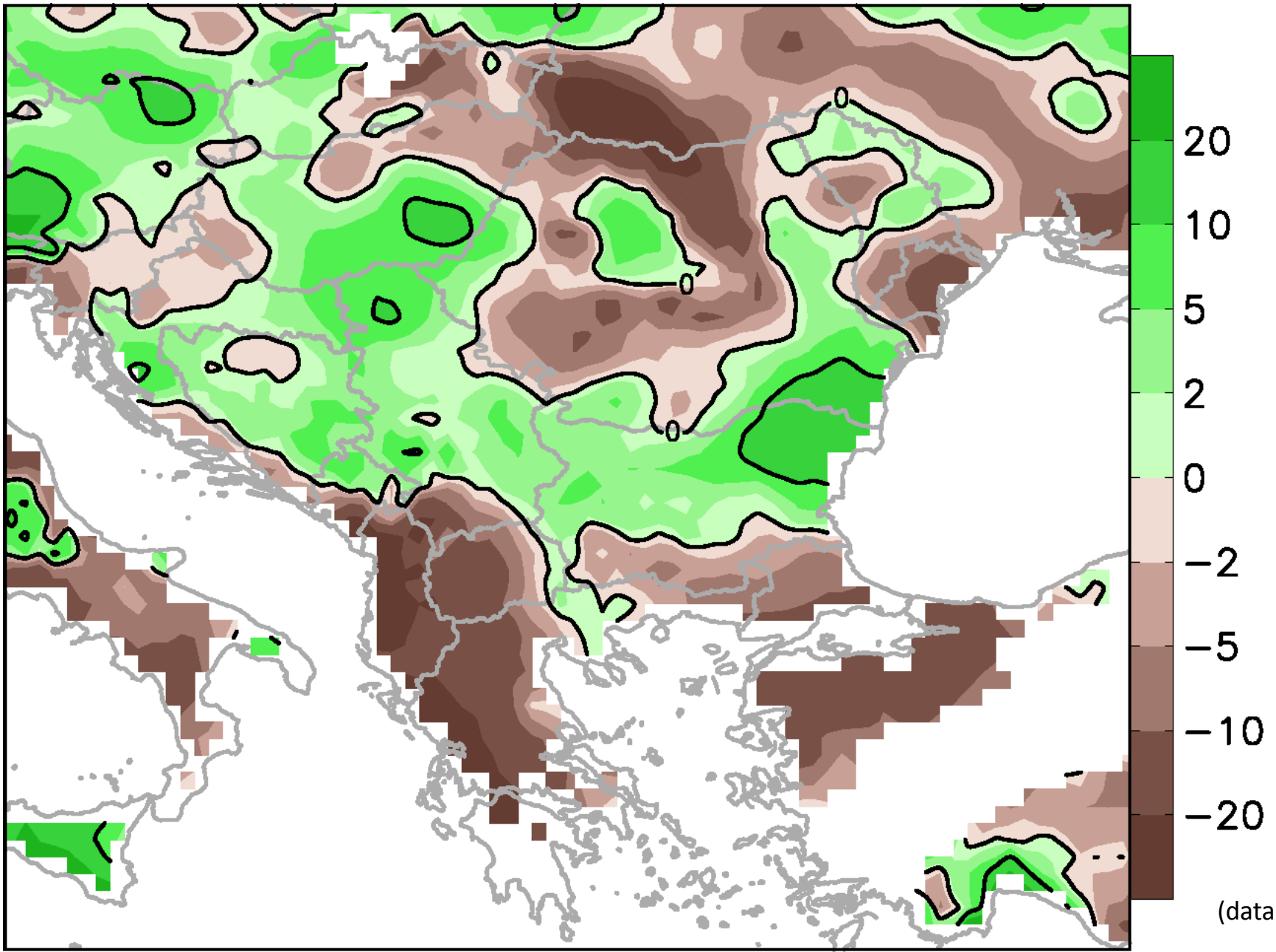


NASA-GISS data

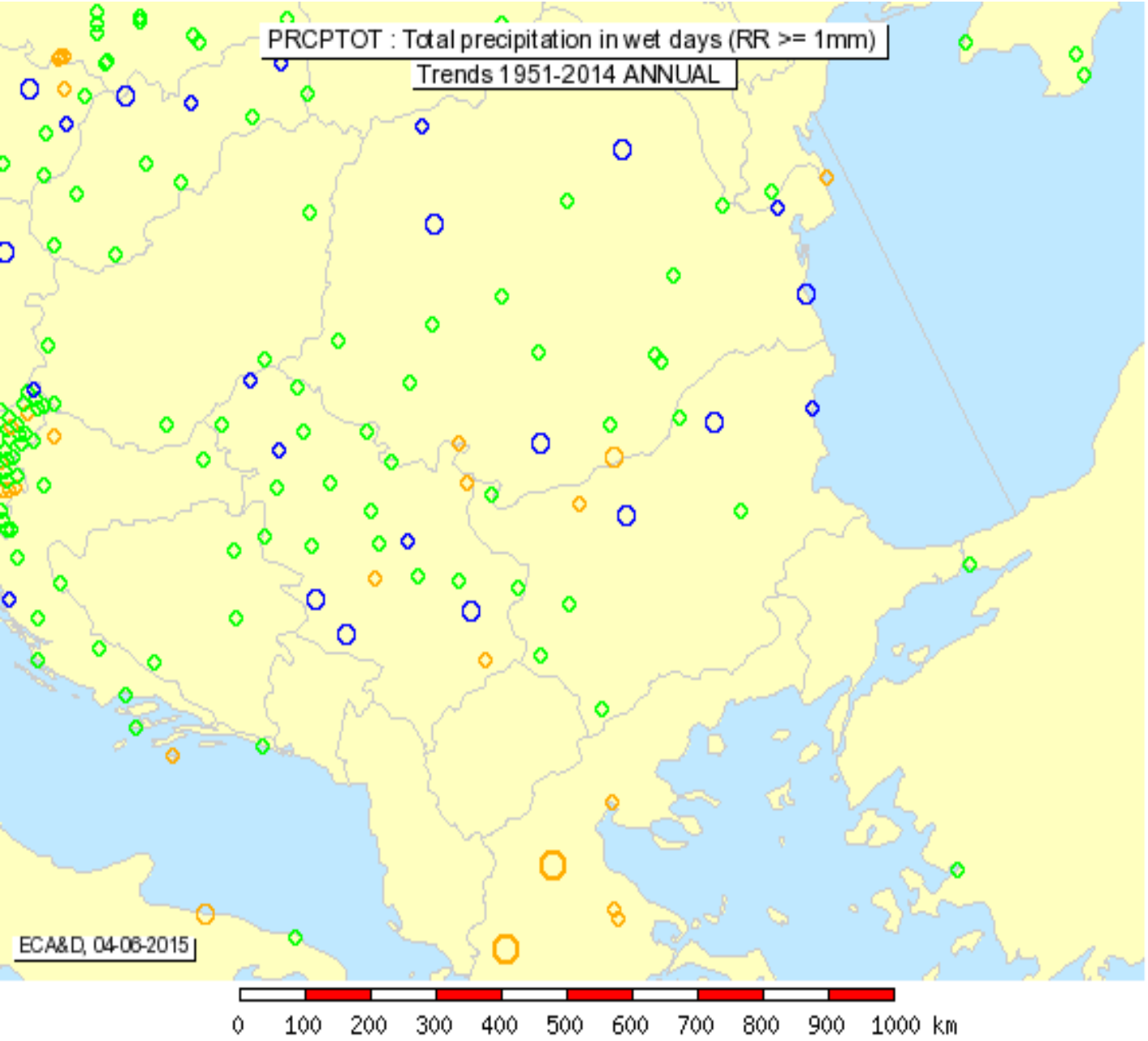
Anomalija teperature (°C) leti (jun-jul-avg) u periodu 1985-2014 (poslednjih 30 godina u odnosu na 1961-1990



Anomalija godišnjih padavina (%) u periodu 1985-2014 (poslednjih 30 godina) u odnosu na 1961-1990

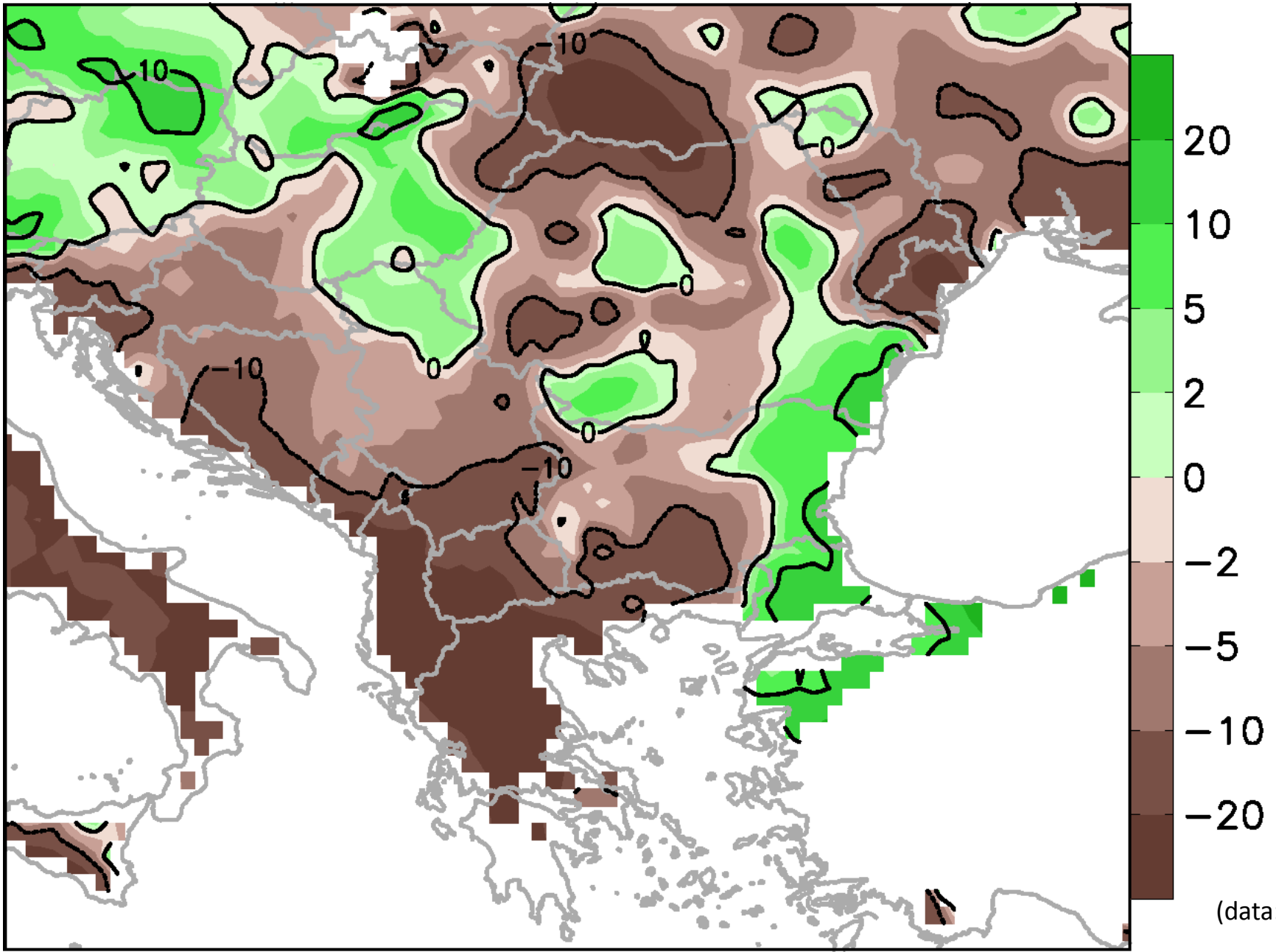


Trend padavina (PRCPTOT >=1mm/day) za period 1951-2014



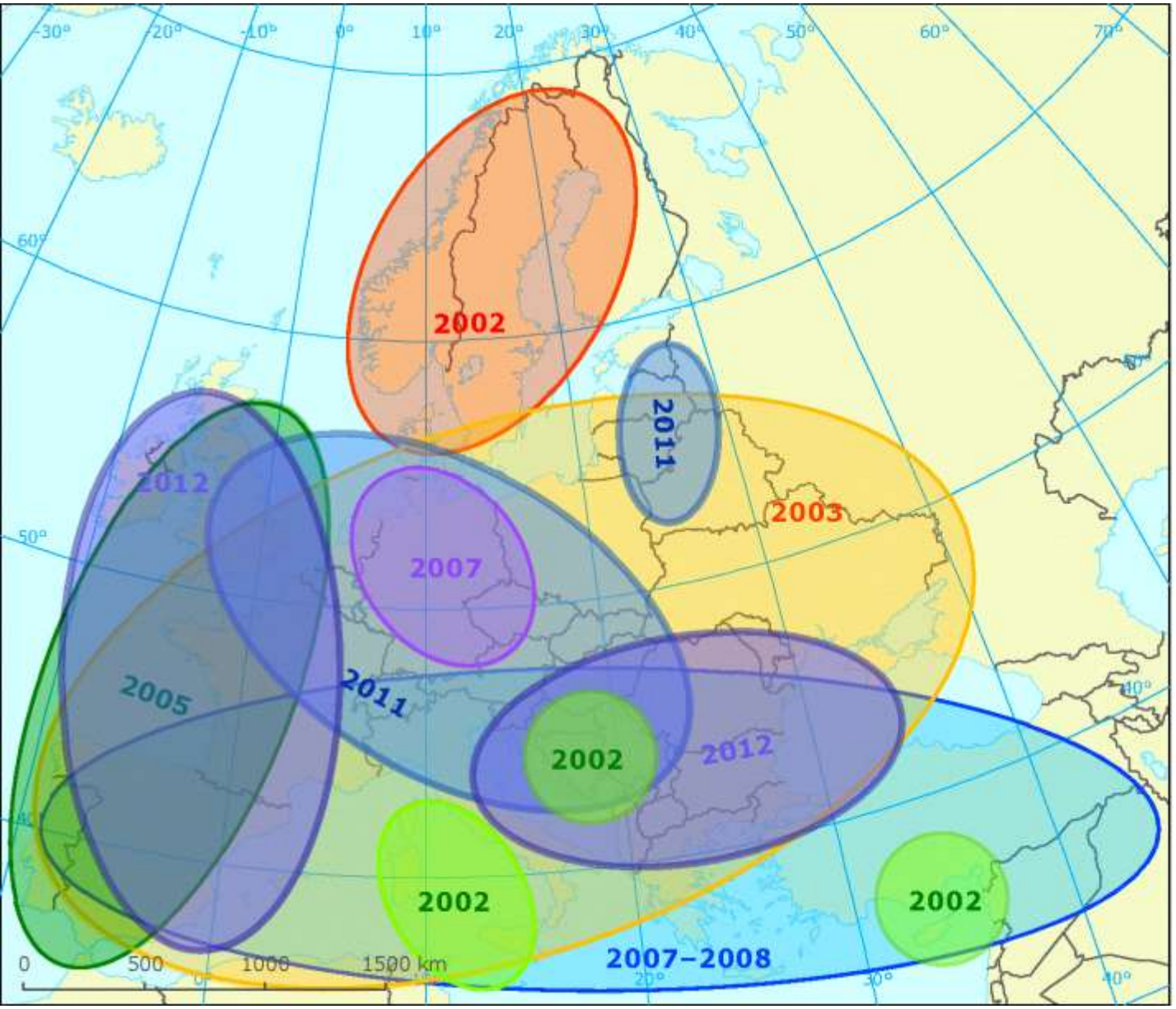
(data: ECA&D)

Anomalija padavina (%) leti (jun-jul-avg) u periodu 1985-2014 (poslednjih 30 godina) u odnosu na 1961-1990



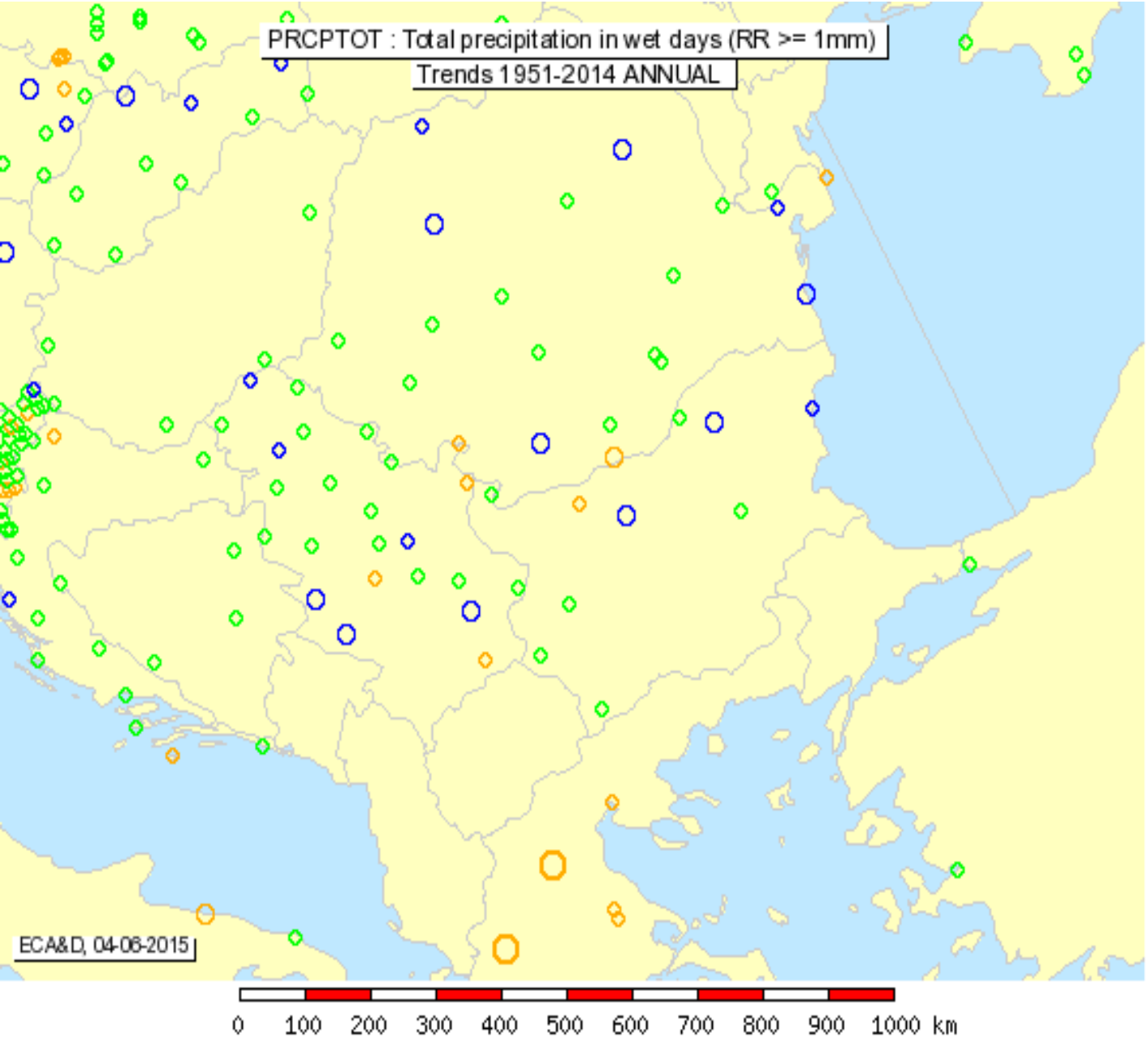
(data: EOBS)

Epizode suša od 2002.



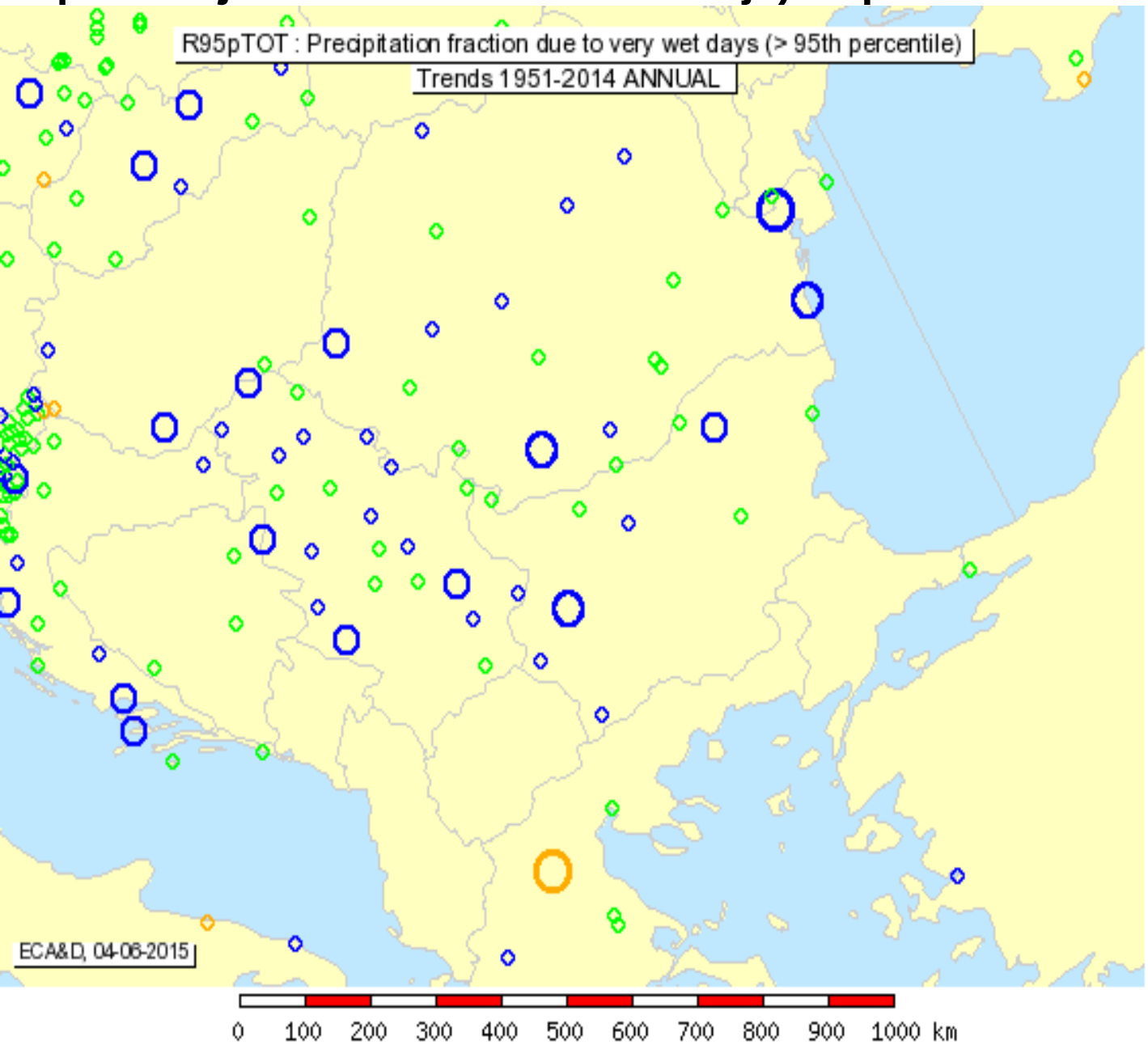
(EEA, 2012)

Trend padavina (PRCPTOT >=1mm/day) za period 1951-2014



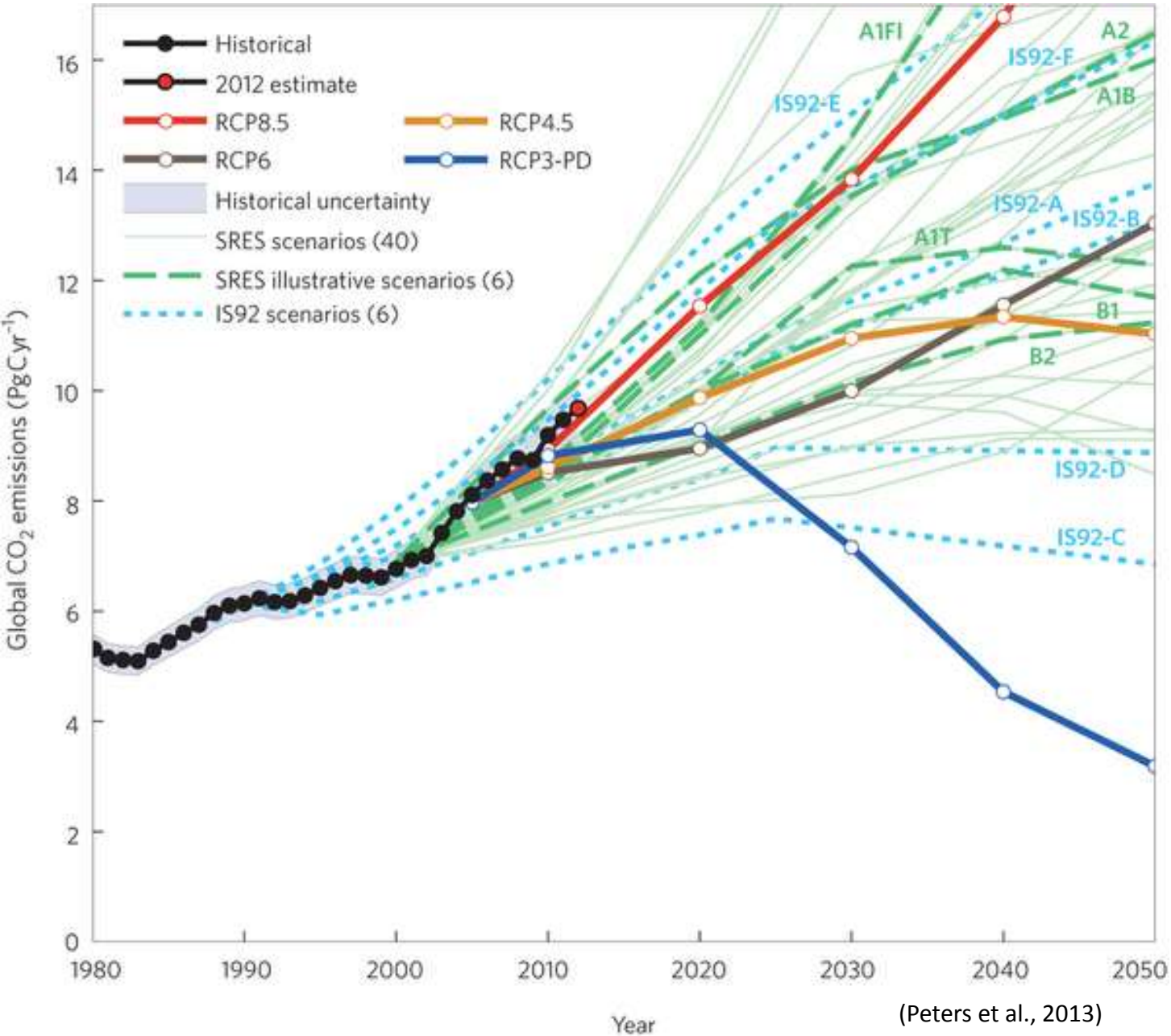
(data: ECA&D)

Trend padavina sa ekstremnim dnevnim akumulacijama (R95pTOT - top 5% najvećih dnevnih akumulacija) za period 1951-2014



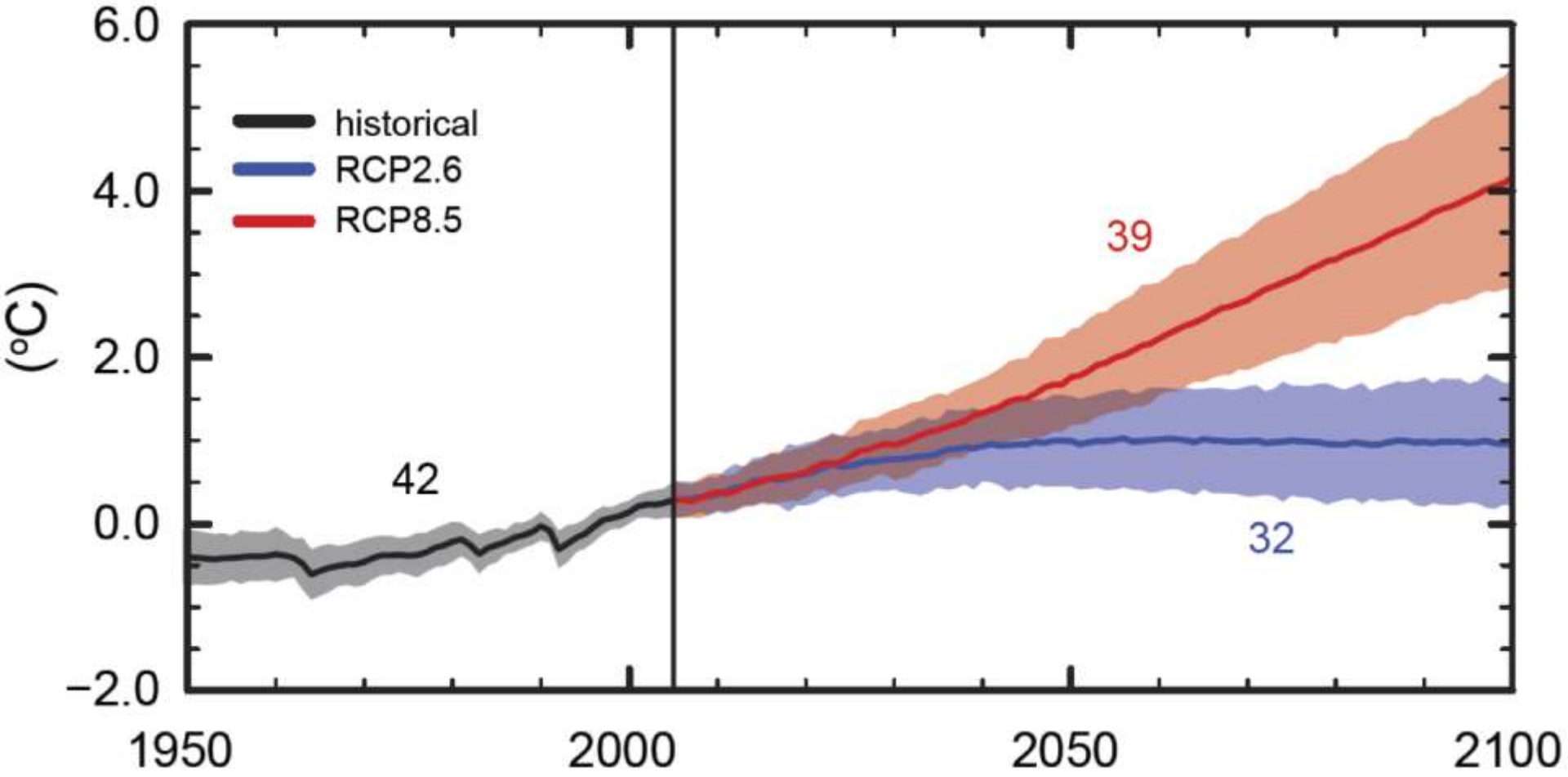
(data: ECA&D)

IPCC – Scenarija globalnih emisija GHG od FAR do AR5



(Peters et al., 2013)

Srednja globalna temperatura do 2100 u zavisnosti od budućih emisija GHG gasova (anomalija u odnosu na 1986-2005)

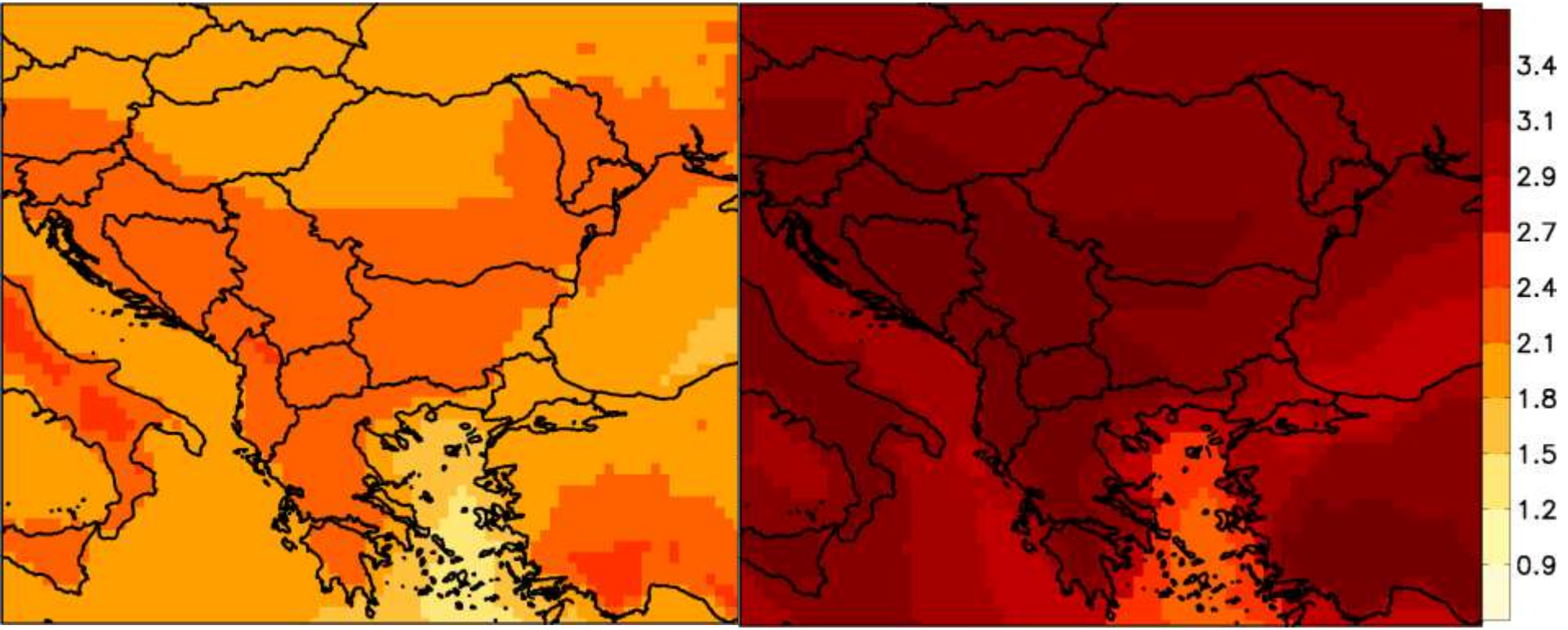


(IPCC WG1., 2013)

EBU-POM regionalni klimatski model (25 km res.)

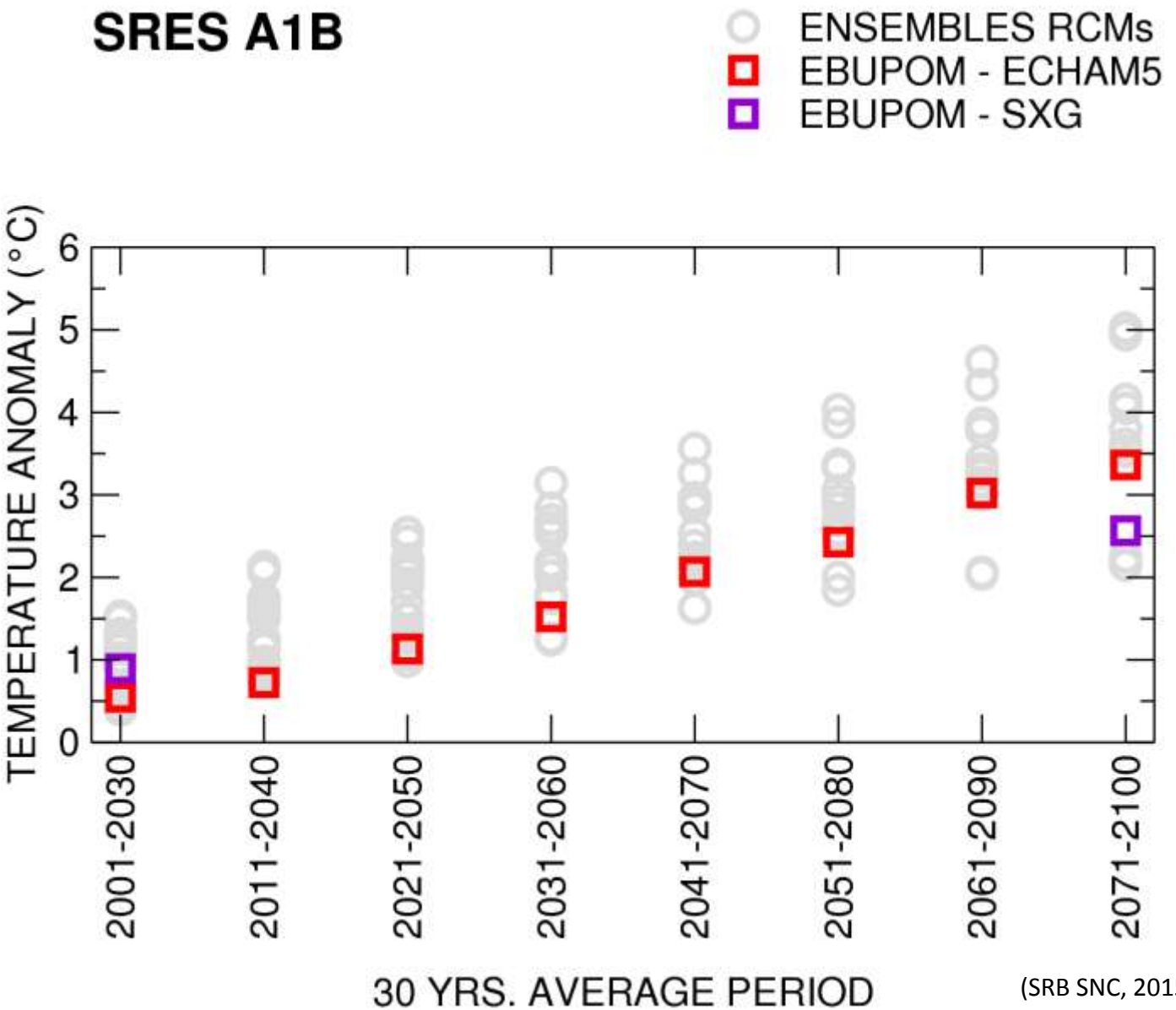
A1B scenario – Povećanje srednje godišnje temperature (°C)

2041-2070 w.r.t. 1961-1990 **2071-2100 w.r.t. 1961-1990**



(SRB SNC, 2015)

A1B scenario – Povećanje srednje godišnje temperature (°C)

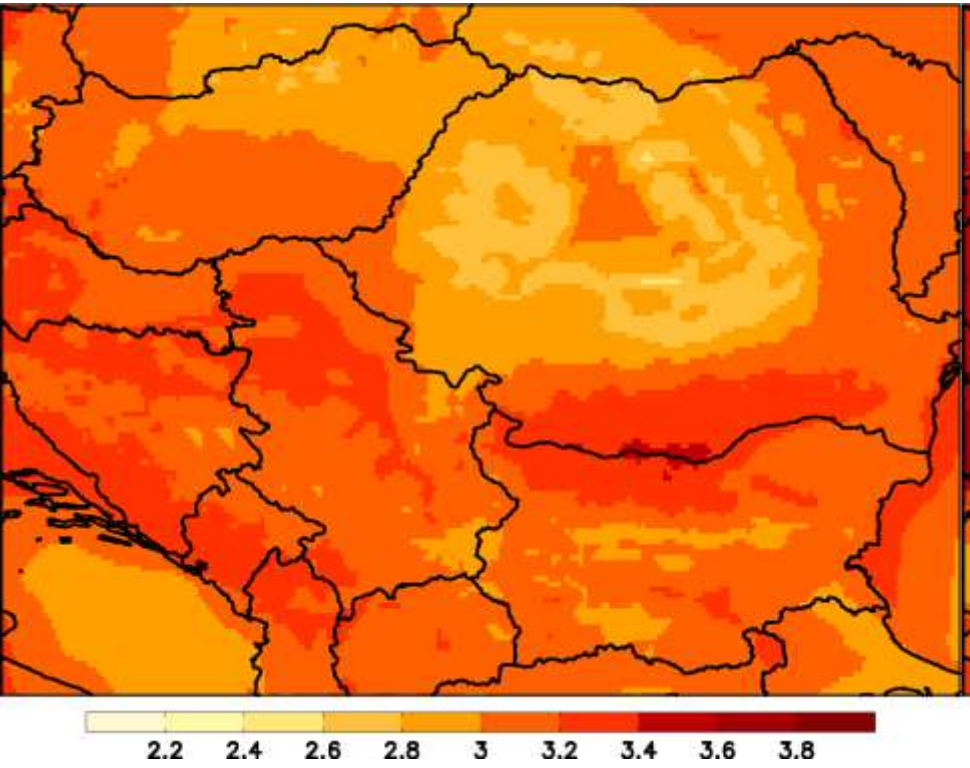


(SRB SNC, 2015)

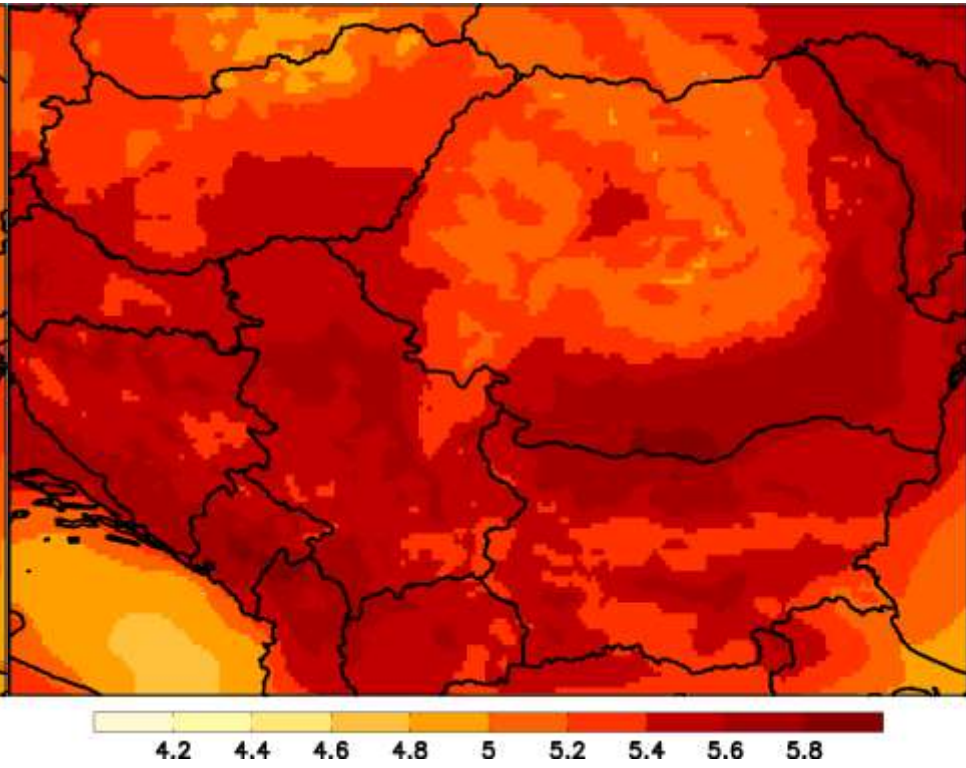
NMMB - model (8 km res.)

RCP8.5 - Povećanje srednje godišnje temperature (°C)

2041-2070 w.r.t. 1971-2000



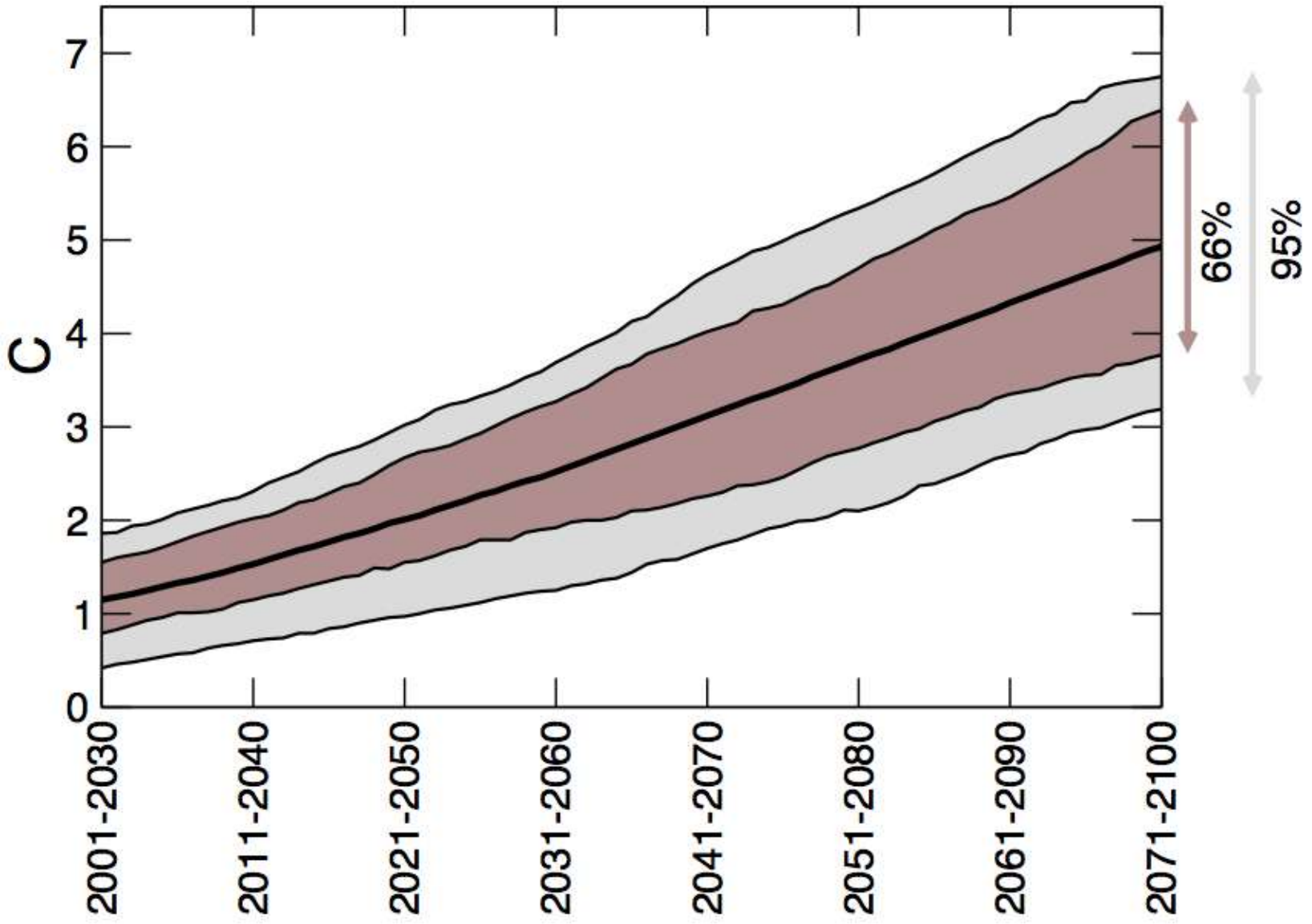
2071-2100 w.r.t. 2071-2100



(ORIENTGATE - RHMSS,
Djurdjvic and Krzic, 2014)

CIMIP5 – Multi-Model ansambl (39 modela)
RCP8.5 (IPCC AR5)

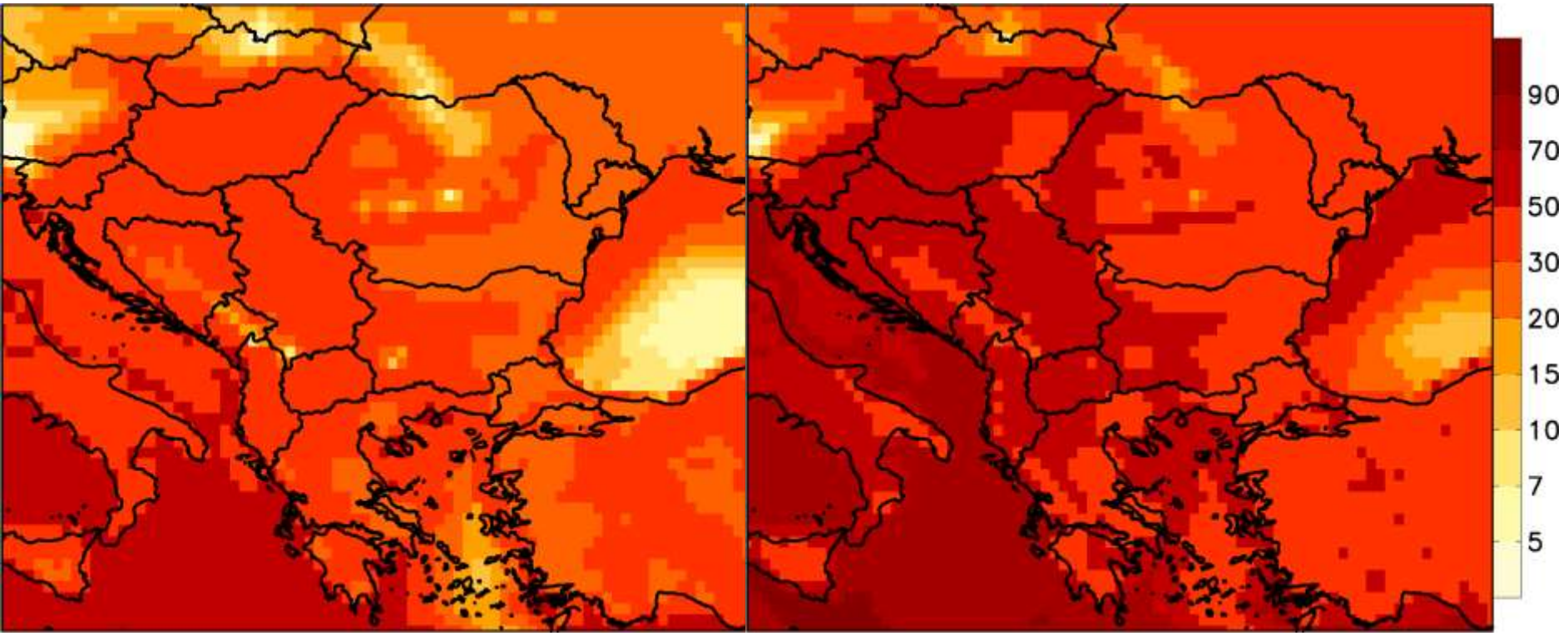
30-godišnji pokretni srednjak odstupanja temperature (°C)



EBU-POM regionalni model (25 km res.)

A1B scenario – Promena broja letnjih dana (TX>25 °C) (dan/godini)

2041-2070 **2071-2100**

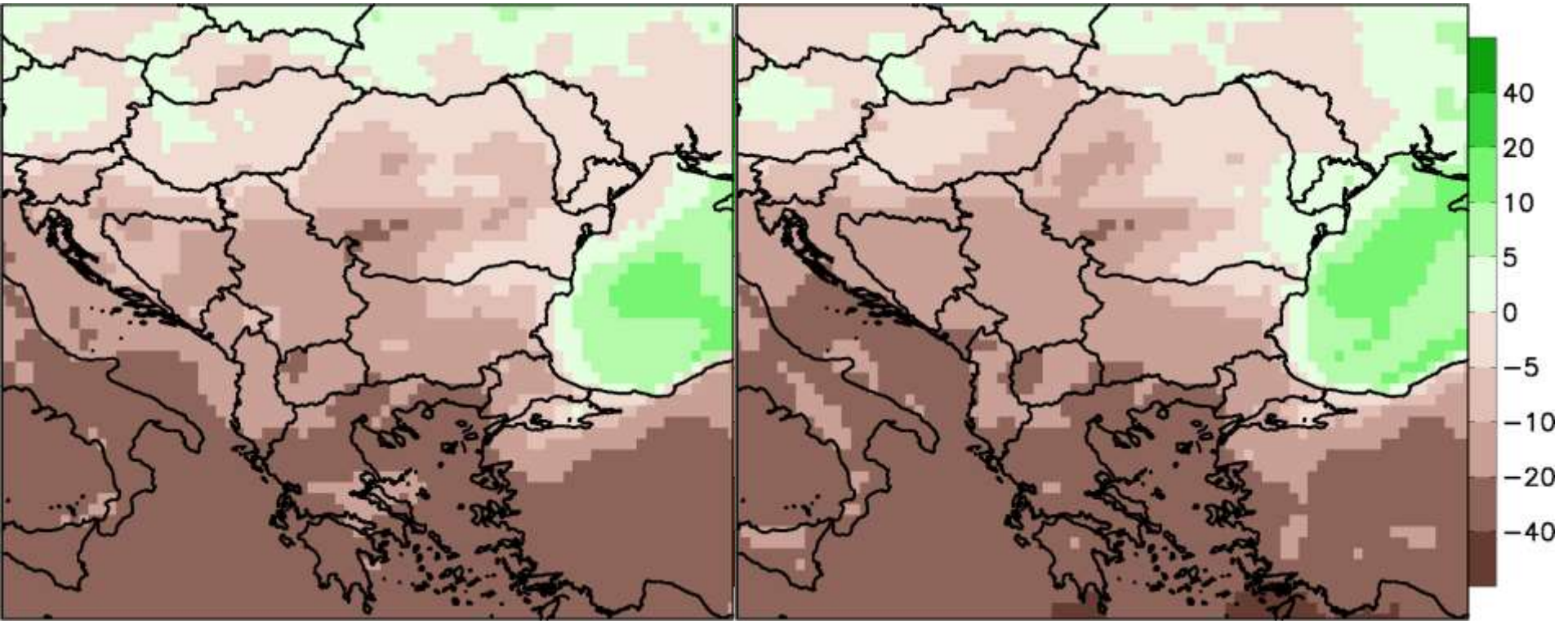


(SRB SNC, 2015.)

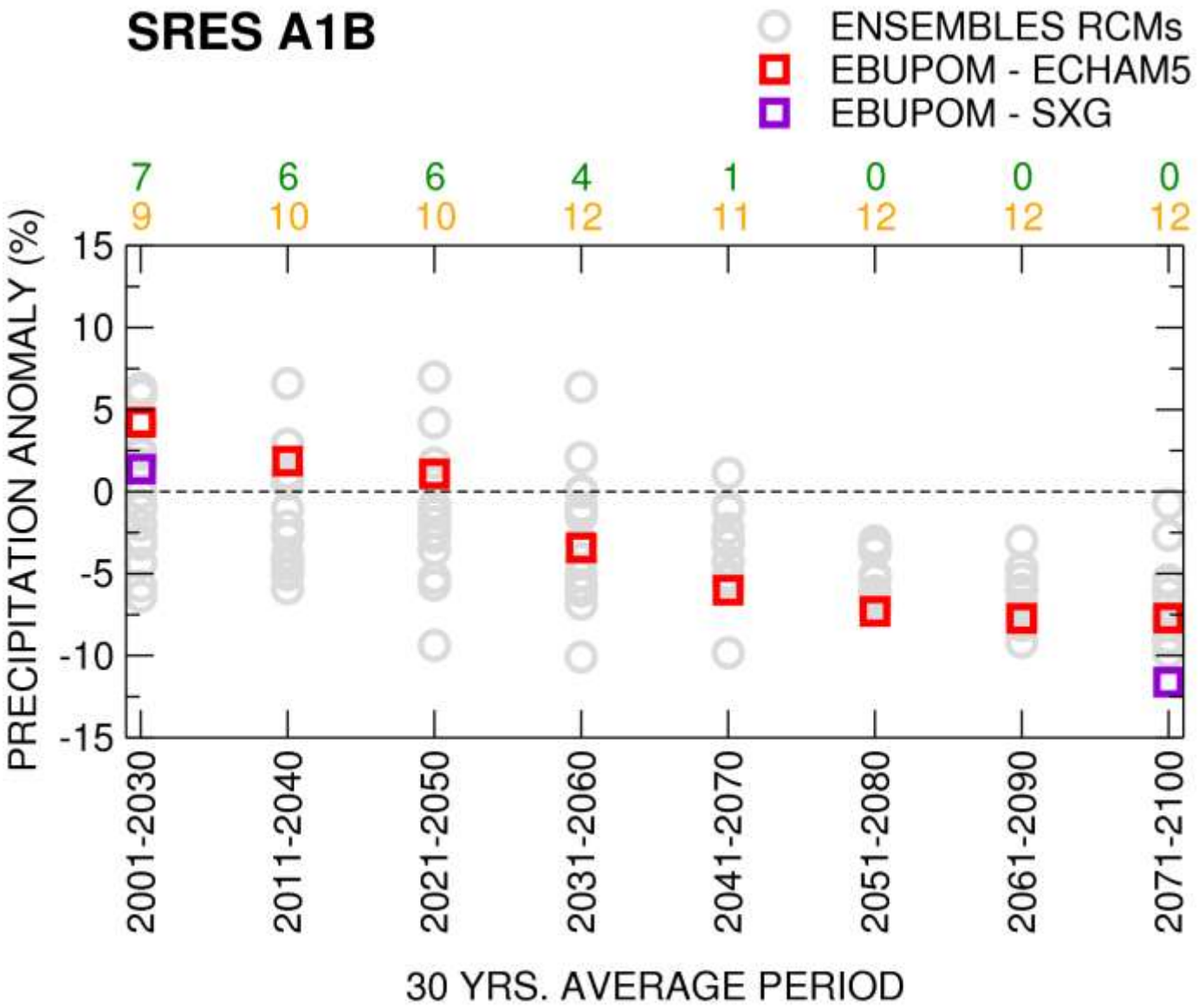
A1B scenario – promena godišnjih padavina (%)

2041-2070

2071-2100



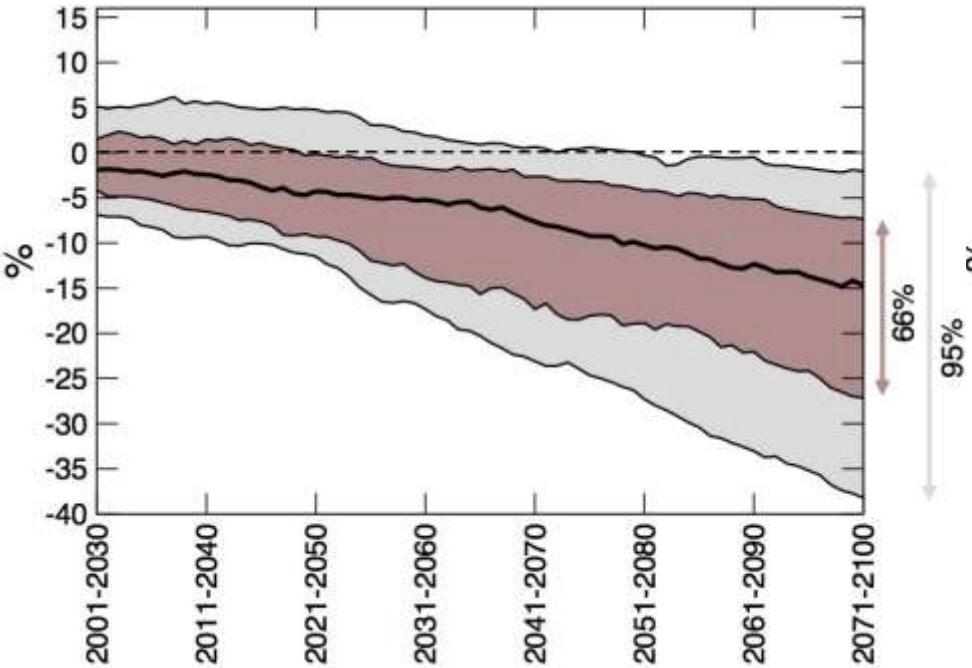
(SRB SNC, 2015, *in prep.*)


SRES A1B
ENSEMBLES RCMs
EBUPOM - ECHAM5
EBUPOM - SXG
7 6 6 4 1 0 0 0
9 10 10 12 11 12 12 12
PRECIPITATION ANOMALY (%)
15
10
5
0
-5
-10
-15
2001-2030
2011-2040
2021-2050
2031-2060
2041-2070
2051-2080
2061-2090
2071-2100
30 YRS. AVERAGE PERIOD
x - number of models with positive anomaly
x - number of models with negative anomaly

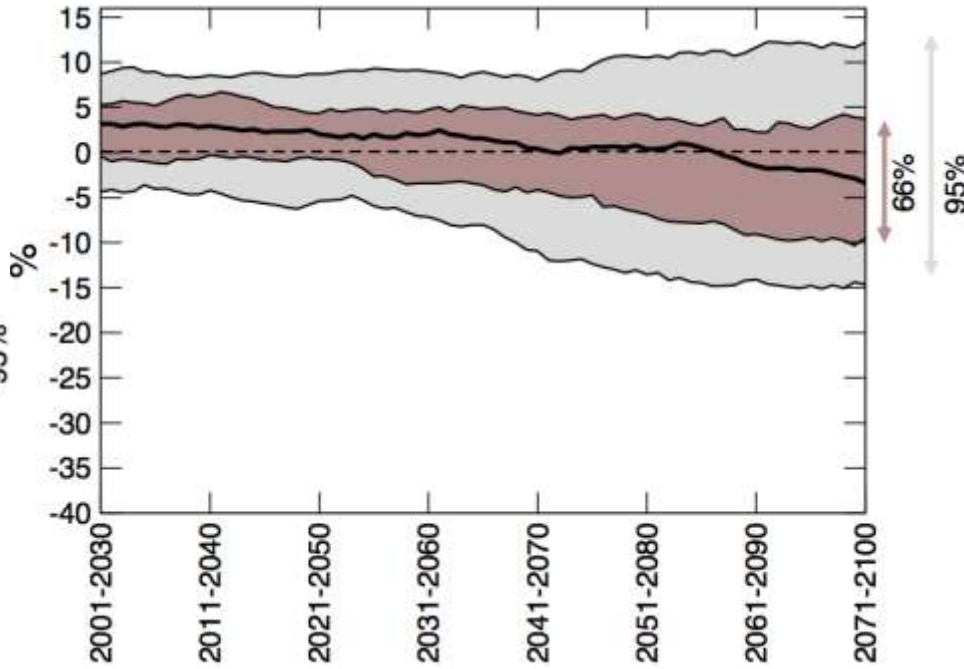
CIMIP5 – Multi-Model ansambl (39 modela)
RCP8.5 (IPCC AR5)

30-godišnji pokretni srednjak promena padavina (%) u regionu

Jug

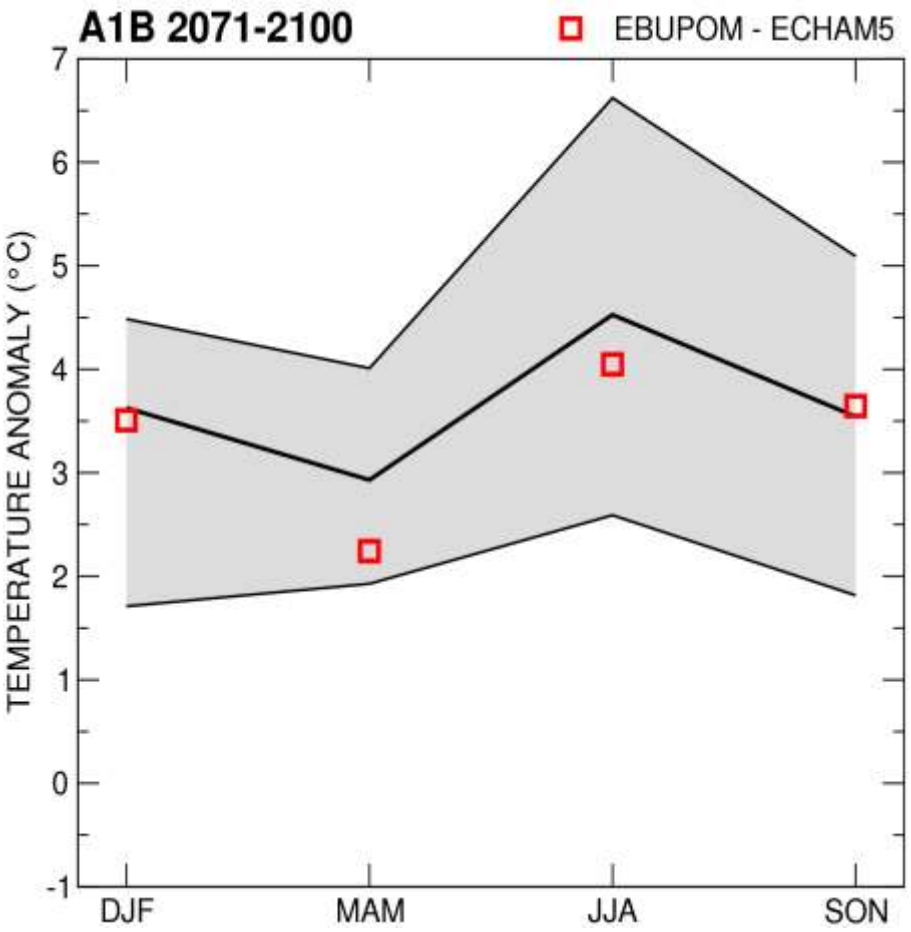


Sever

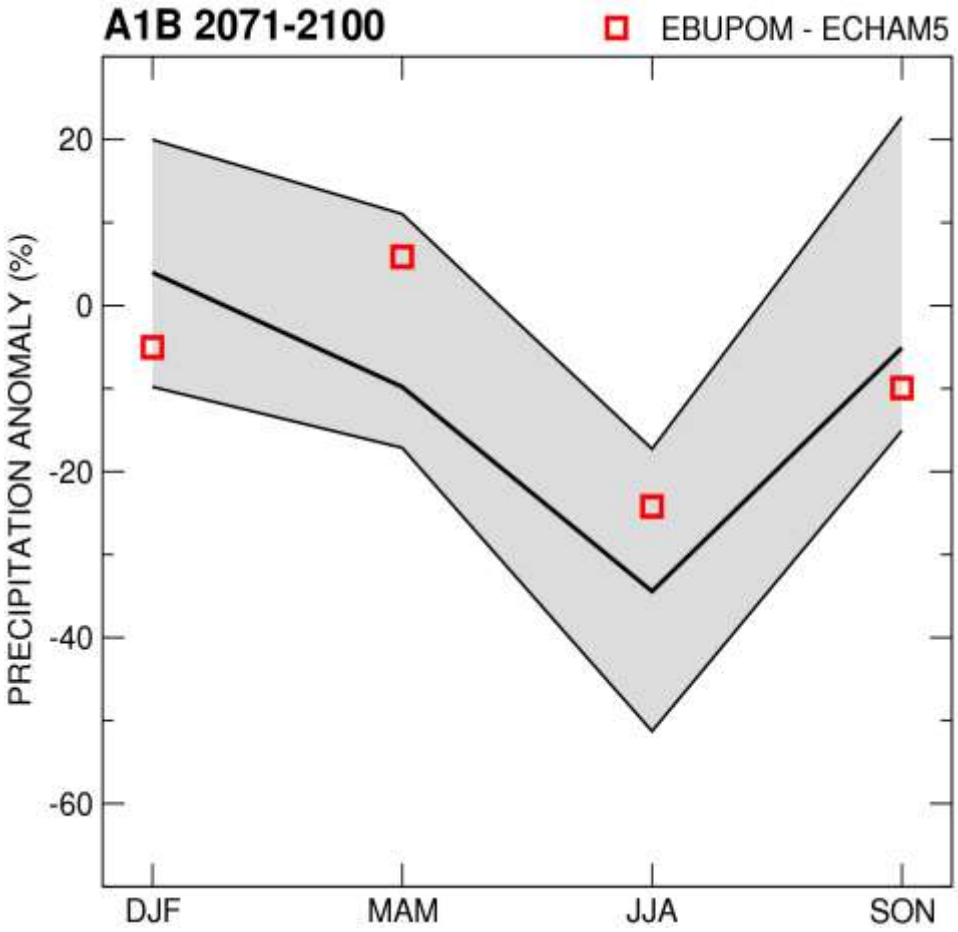


Sezonske promene - Srbija

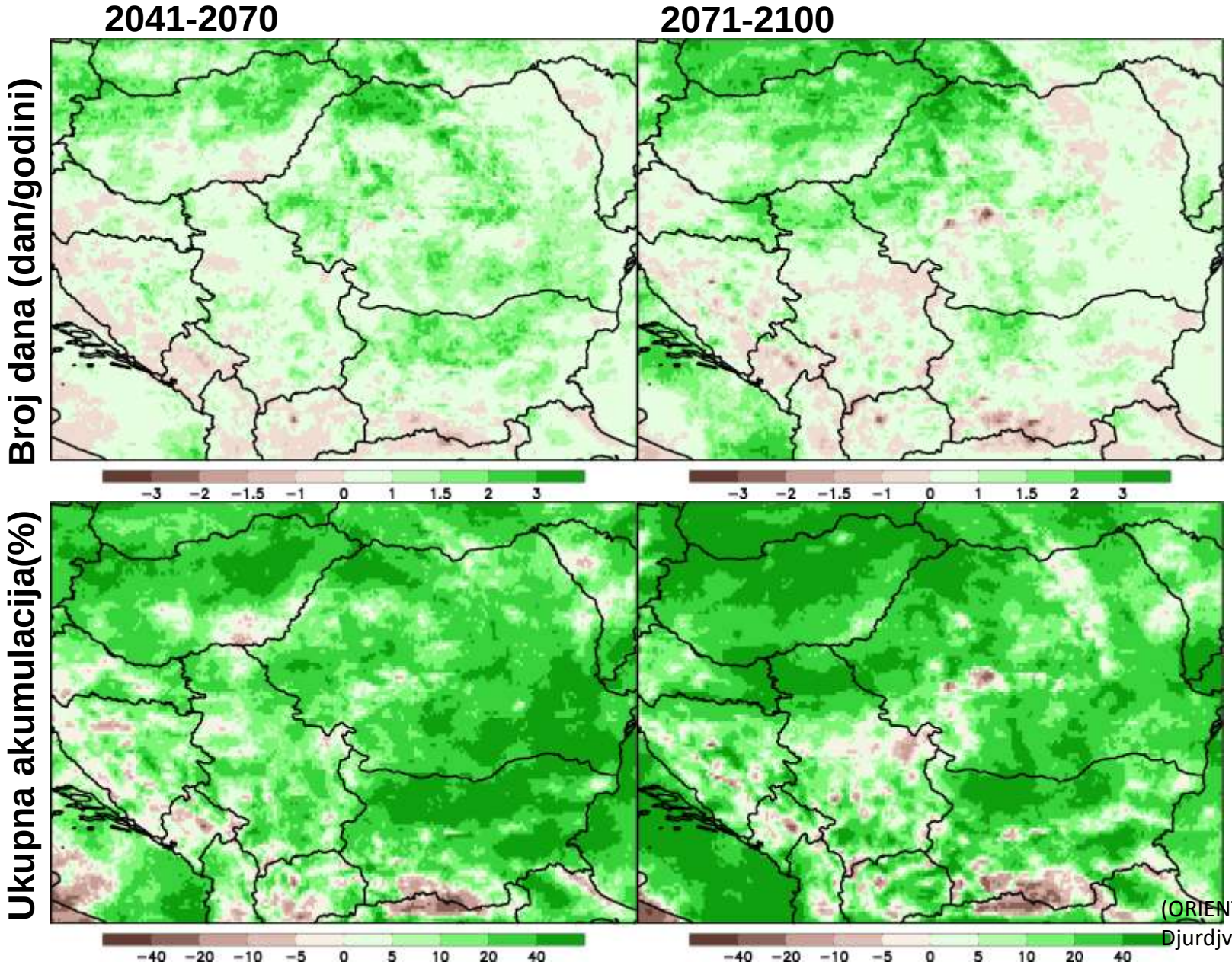
Temperatura



Padavine



NMMB - model (8 km res.)
RCP8.5 scenario – promena top 5% najačih padavina

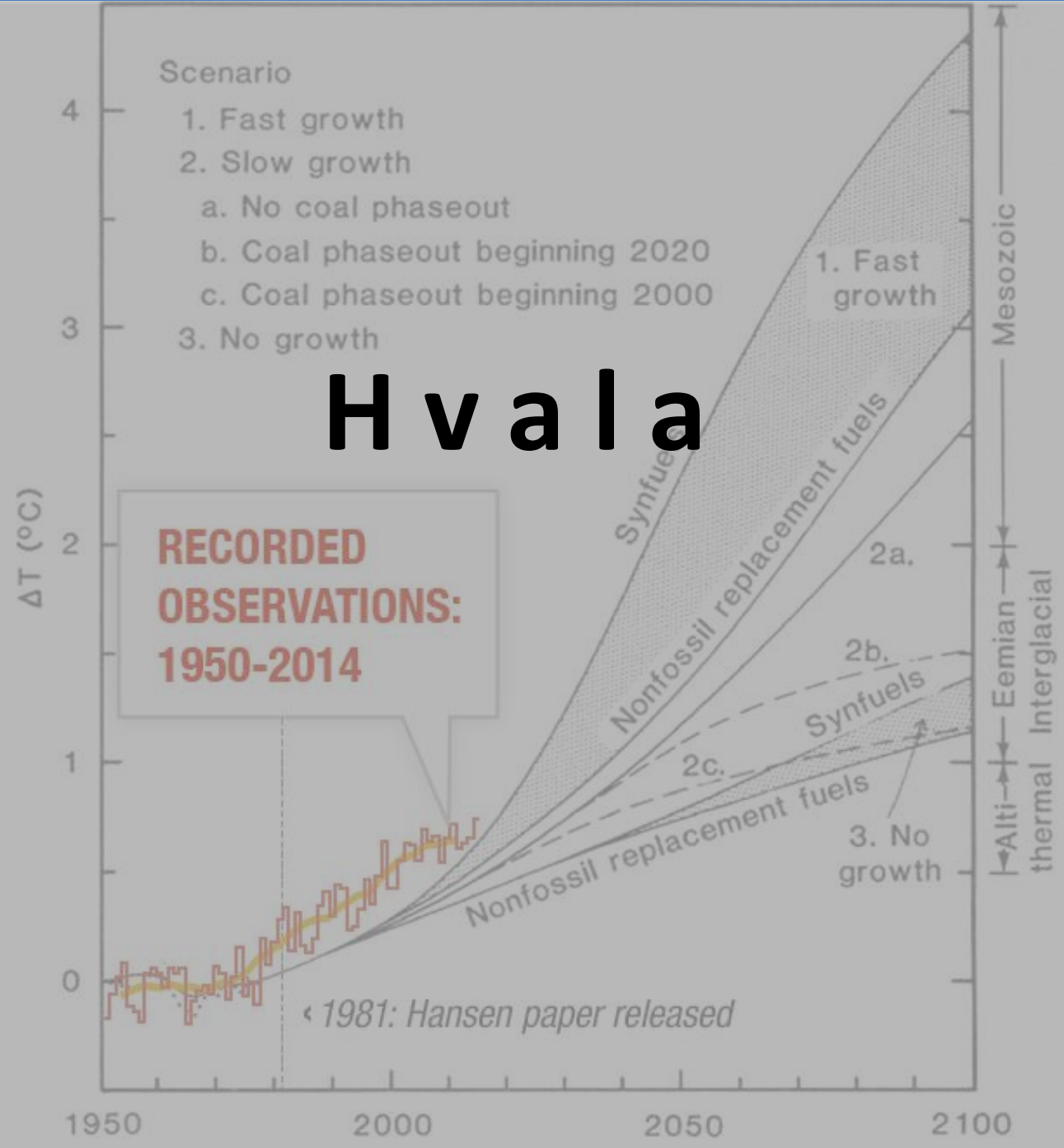


(ORIENTGATE - RHMSS, Djurdjvic and Krzic, 2014)

Rezime budućih promena u slučaju izostanka redukcije emisija gasova staklene bašte

- Temperatura:
  - Dalji porast temperature
  - ~4°C do kraja veka
- Padavine:
  - Neizvestan znak promene u narednih nekoliko dekada
  - Deficit u drugoj polovini veka
    - ~-10 % na godišnjem nivou
    - moguće do -50 % za sezonu jun-jul-avgust
- Intenziviranje ekstrema, za pojedine i pozitivna promena učestalosti

Trenutni plan međunarodne zajednice je da se kroz dogovor o smanjenju emisija gasova staklene bašte, ograniči porast srednje globalne temperature na maksimalno 2 °C.


Scenario
1. Fast growth
2. Slow growth
a. No coal phaseout
b. Coal phaseout beginning 2020
c. Coal phaseout beginning 2000
3. No growth
RECORDED OBSERVATIONS: 1950-2014
1. Fast growth
Synfuels
Nonfossil replacement fuels
2a.
2b.
Synfuels
2c.
Nonfossil replacement fuels
3. No growth
1981: Hansen paper released
ΔT (°C)
0
1
2
3
4
1950
2000
2050
2100
Mesozoic
Eemian
Alti-thermal
Interglacial

H v a l a