

Climate extremes and challenges

Sandor Szalai

Szent Istvan University

szalai.sandor@mkk.szie.hu

Content

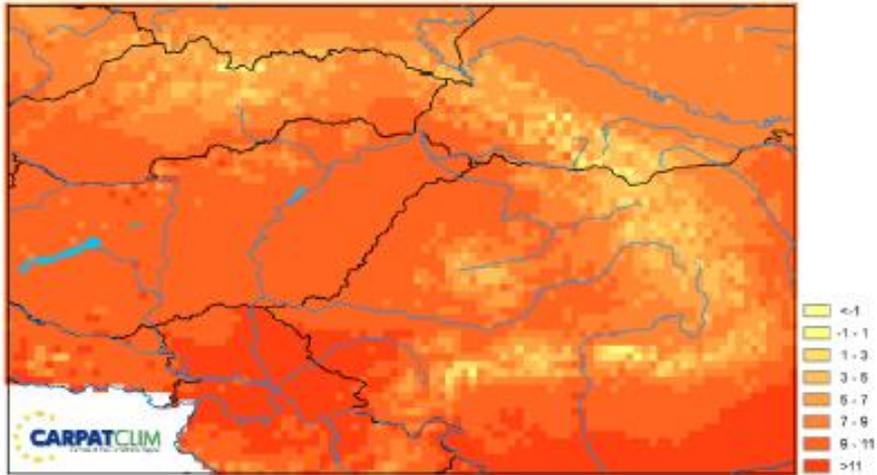
- Past, tendencies
- Forecast
- Projections

Past

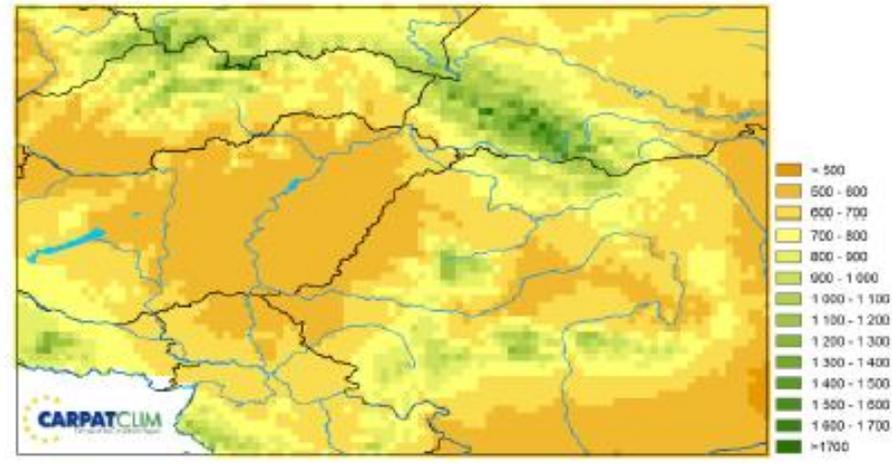
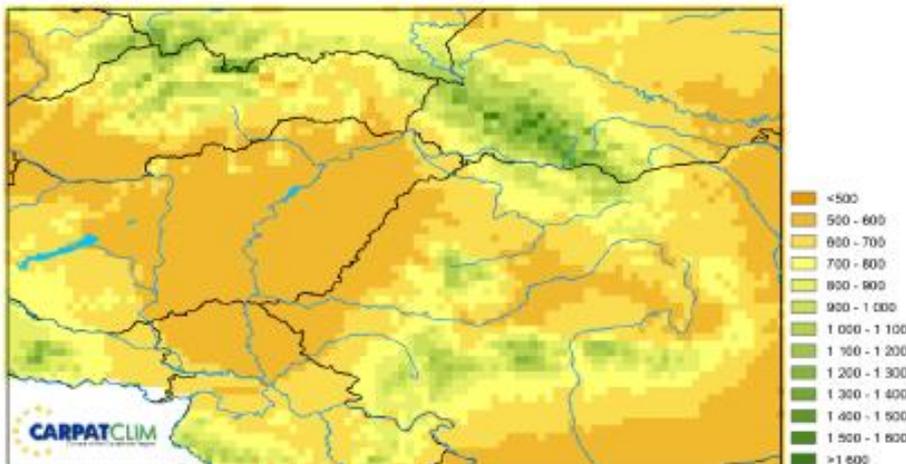
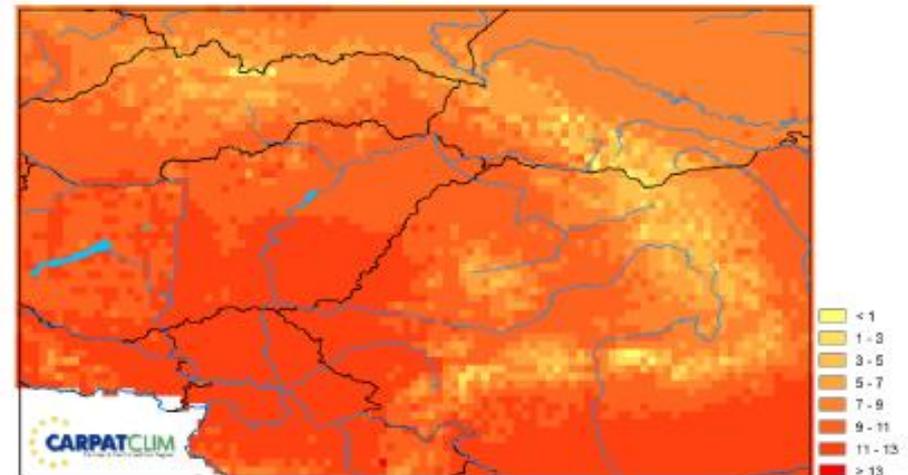
www.carpatclim-eu.org

Temperature and precipitation averages

1961-90

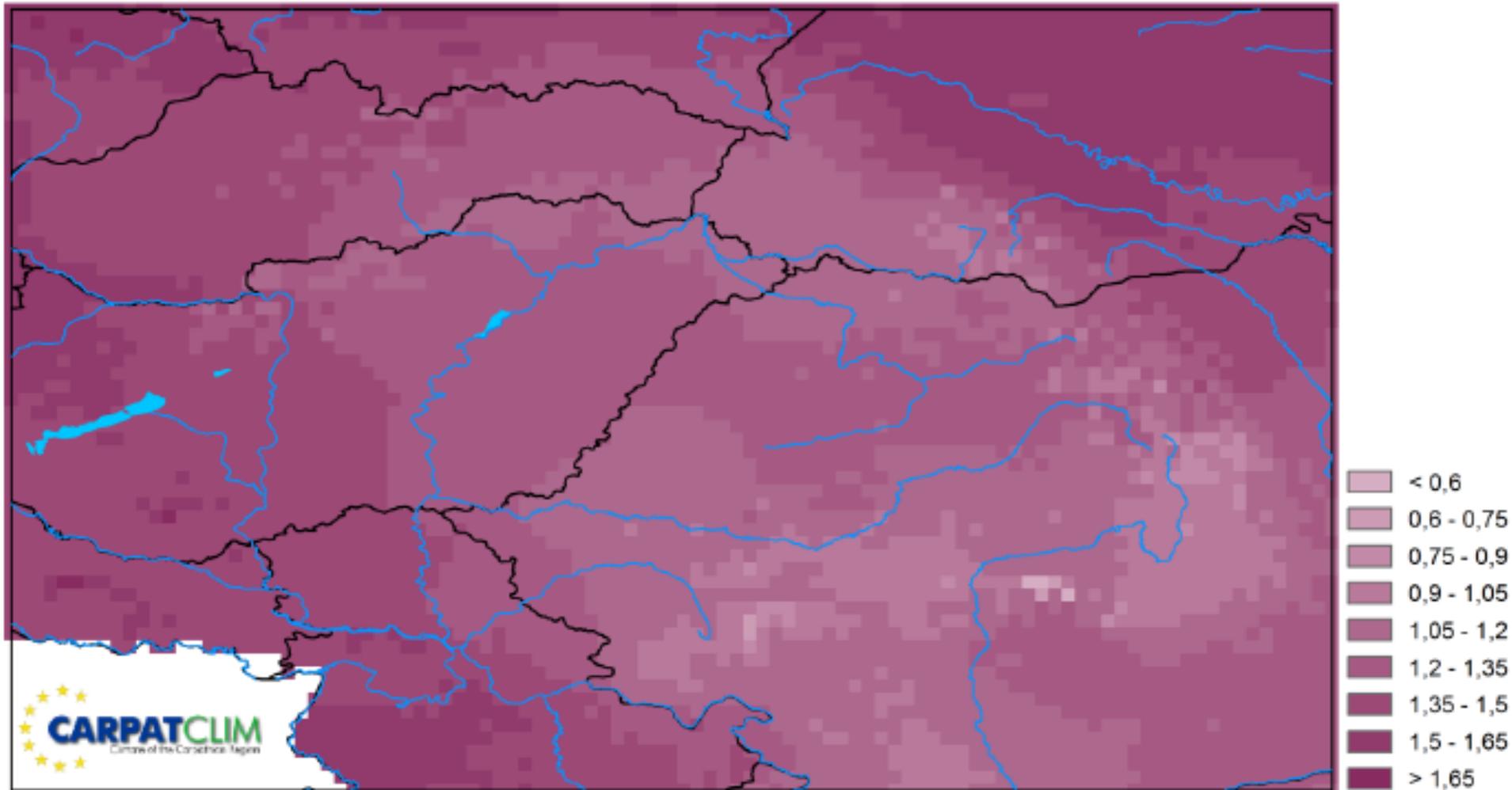


1981-2010



(Lakatos et al., 2013)

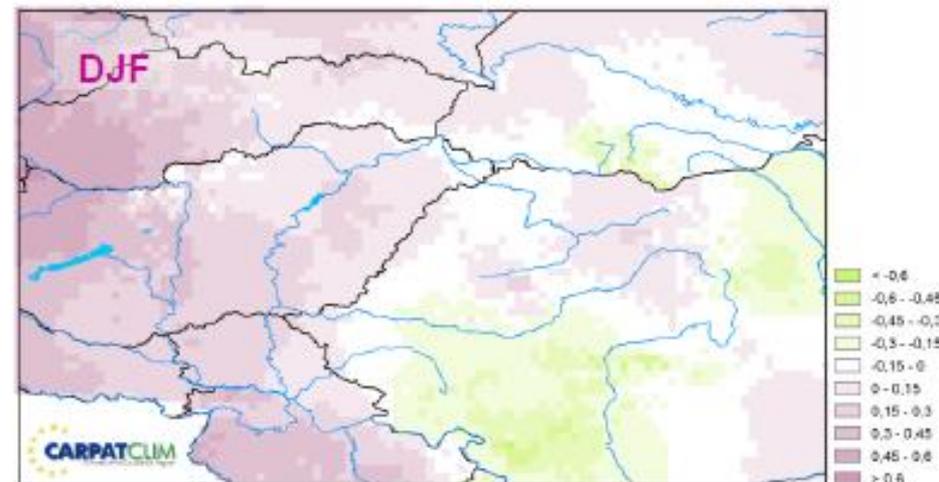
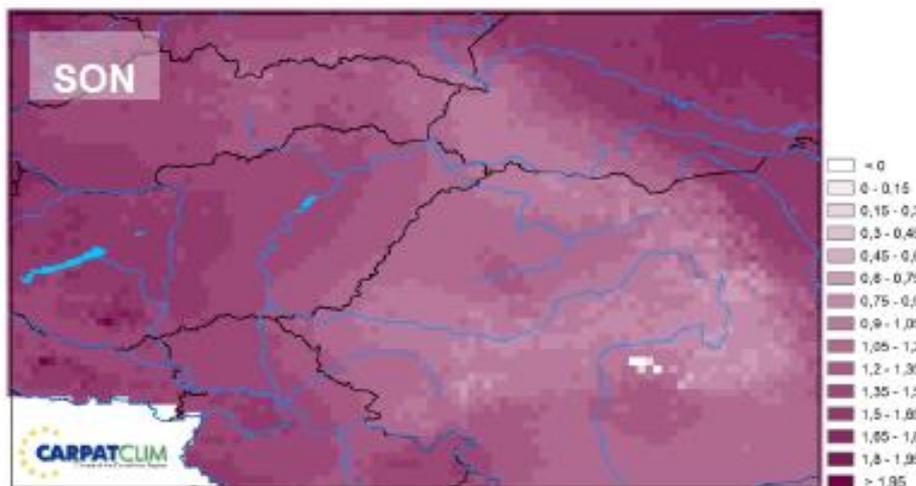
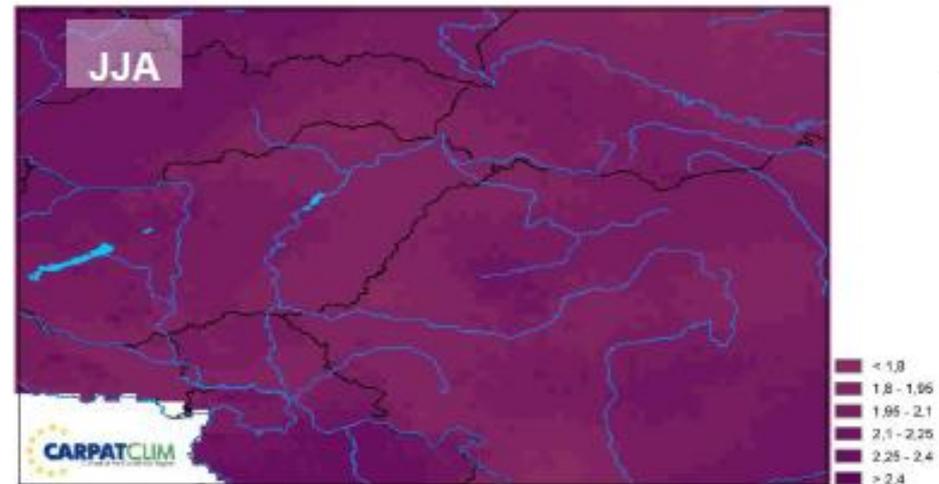
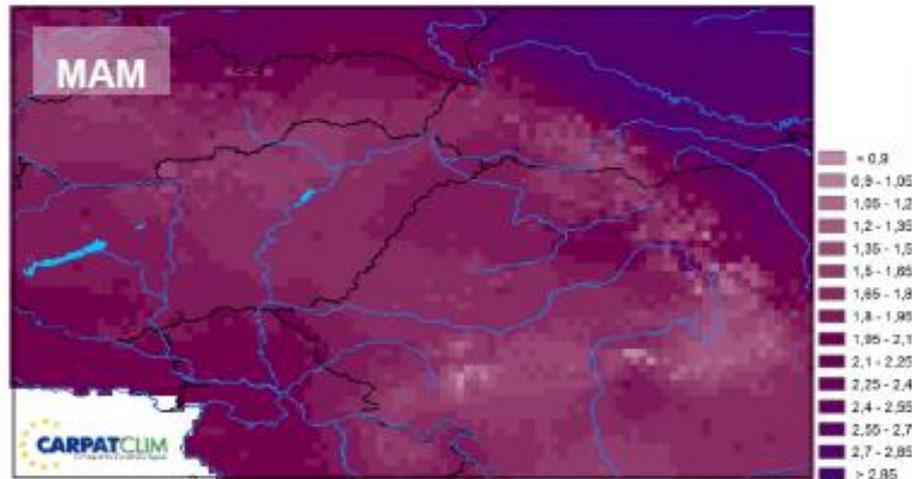
Temperature changes, 1961-2010



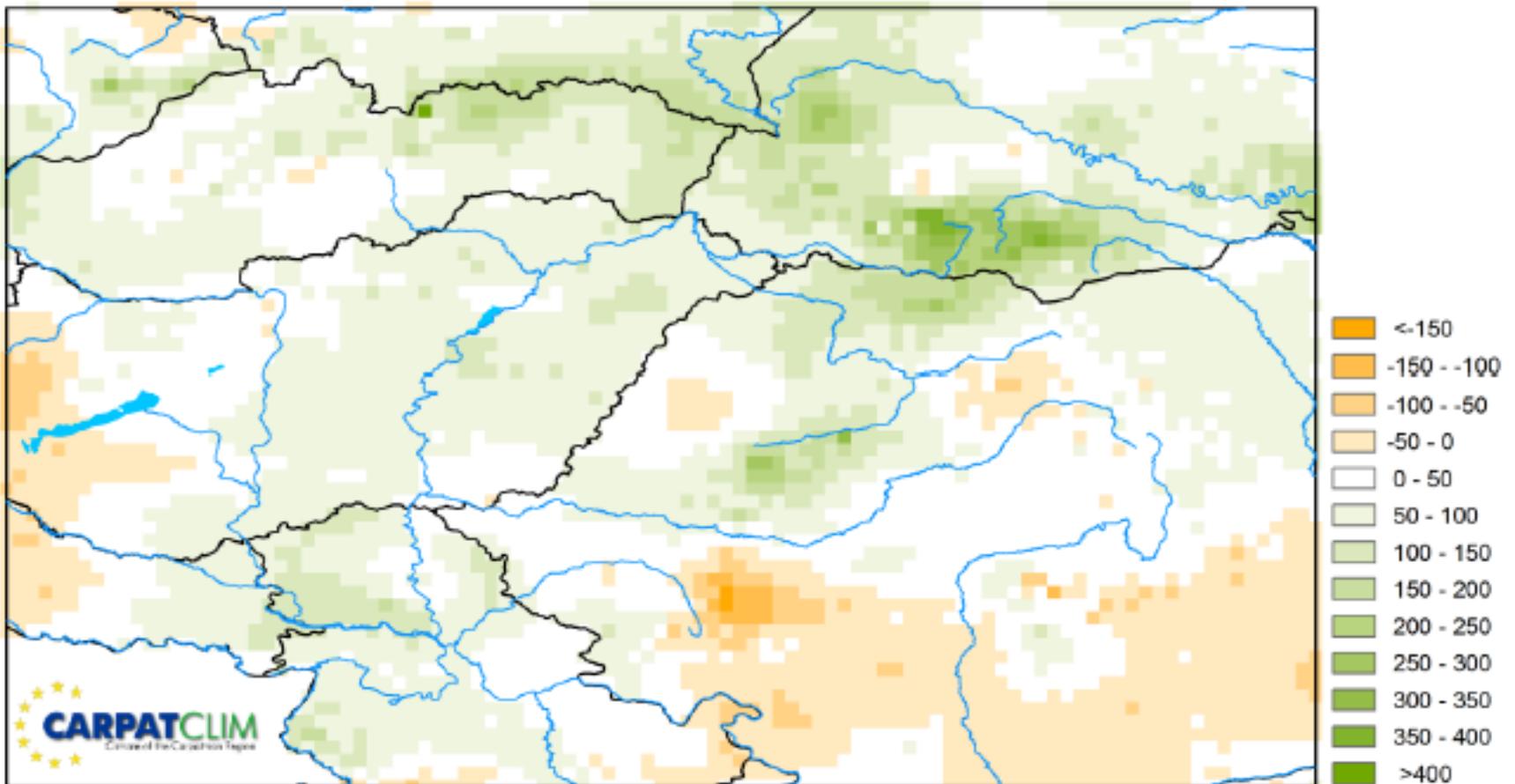
(Lakatos et al., 2013)

Seasonal temperature changes, 1961-2010

(Lakatos et al., 2013)

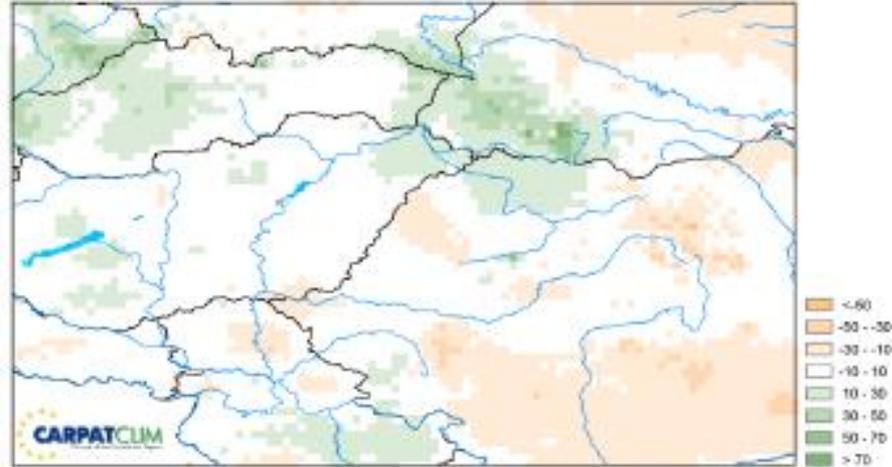


Change of the annual precipitation sum 1961-2010

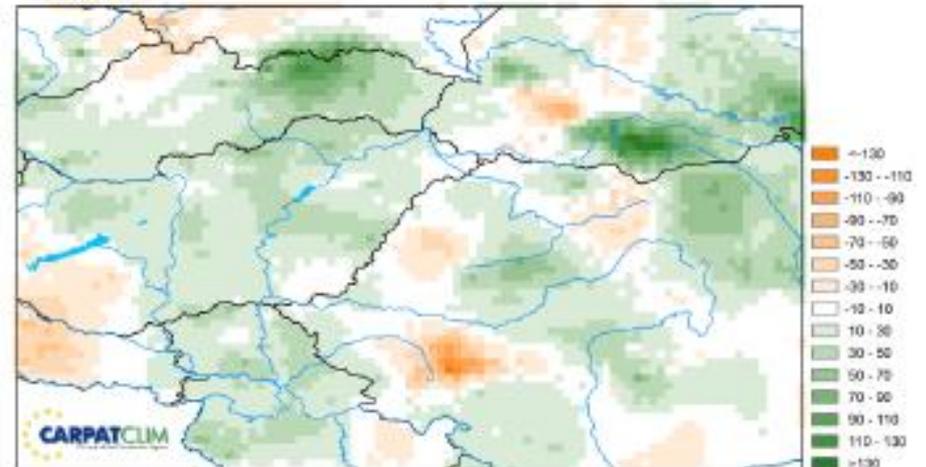


Change of the seasonal precipitation sums 1961-2010

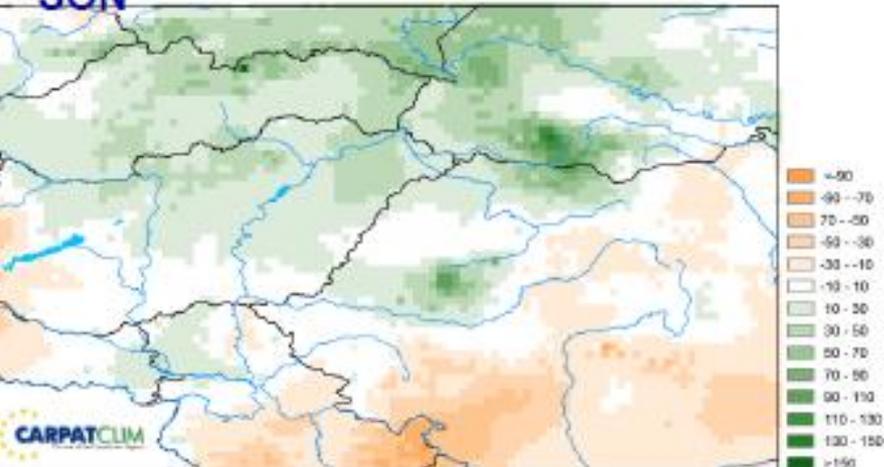
MAM



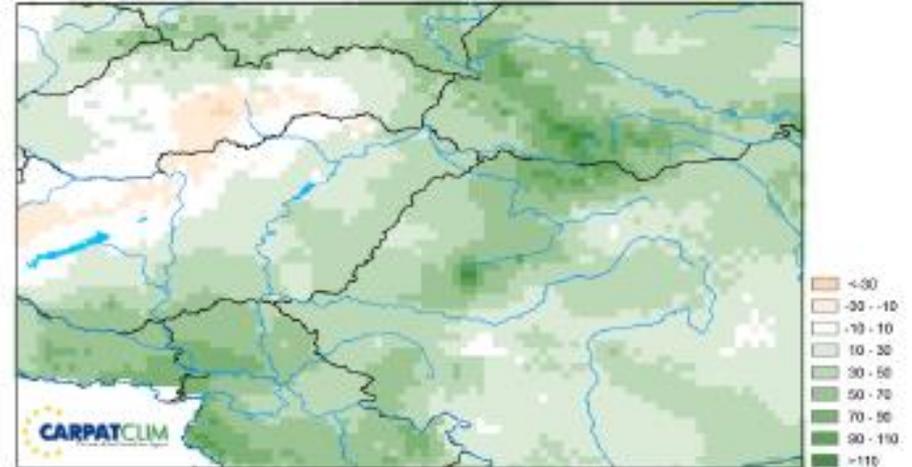
JJA



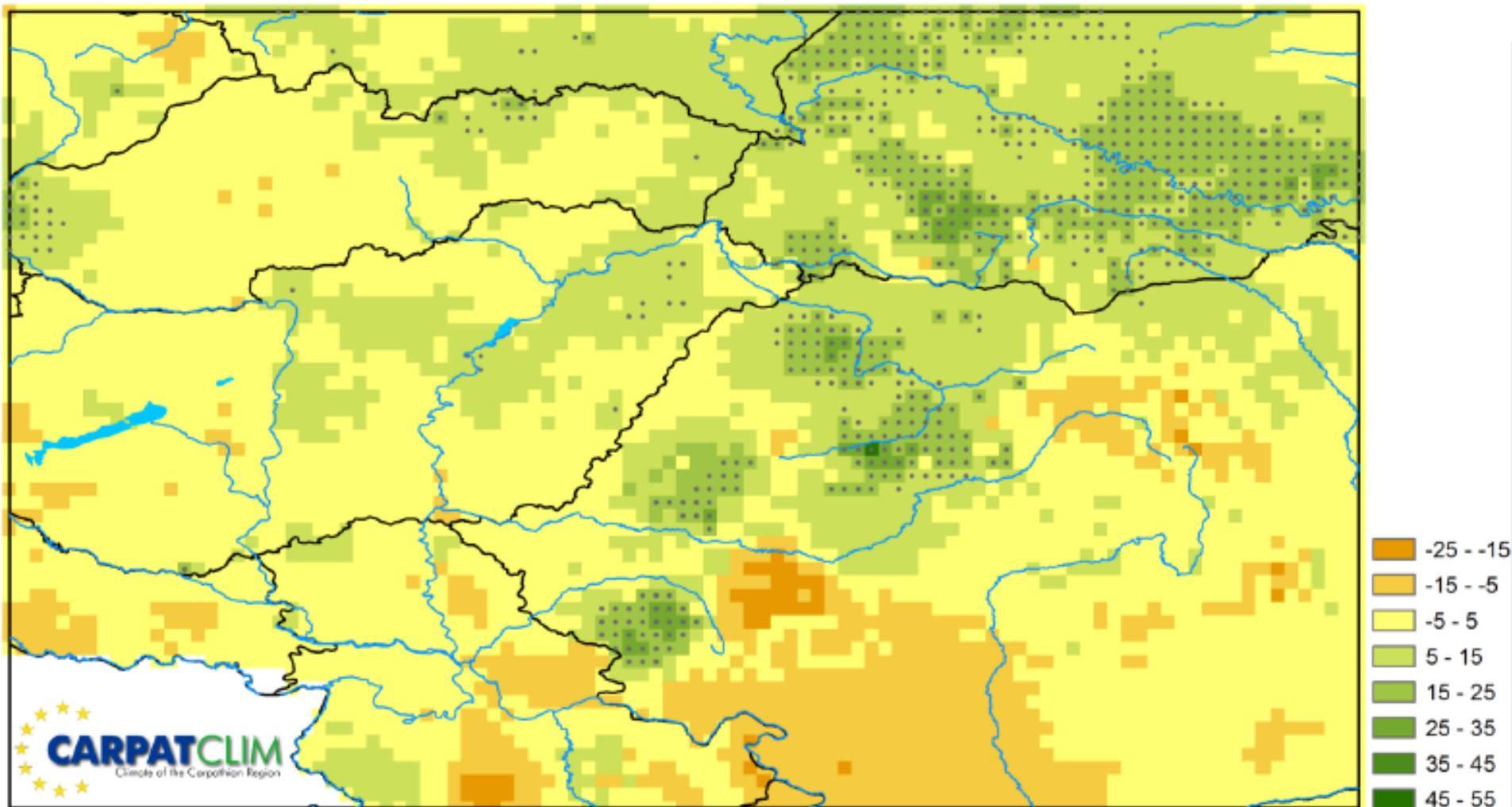
SON



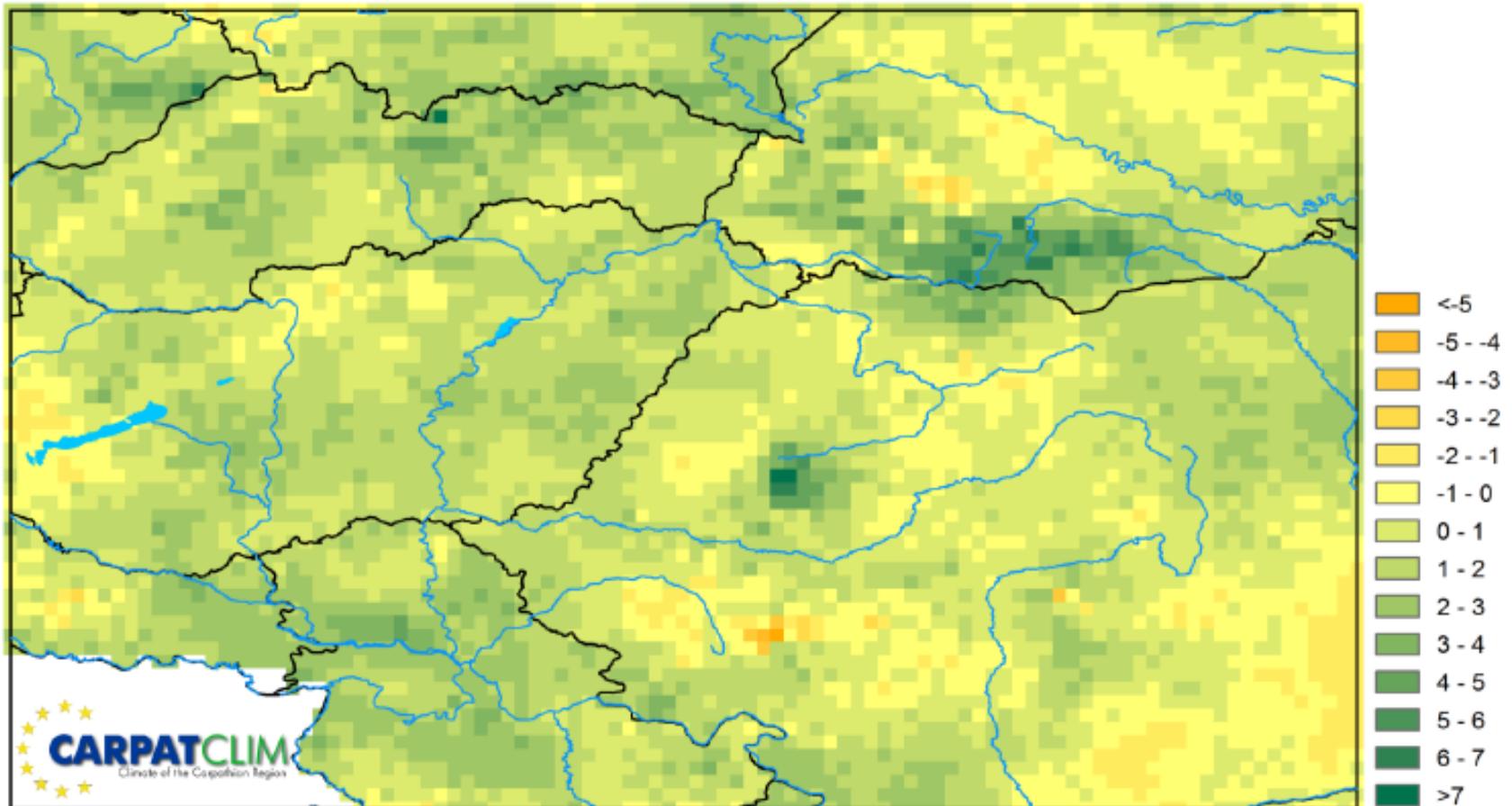
DJF



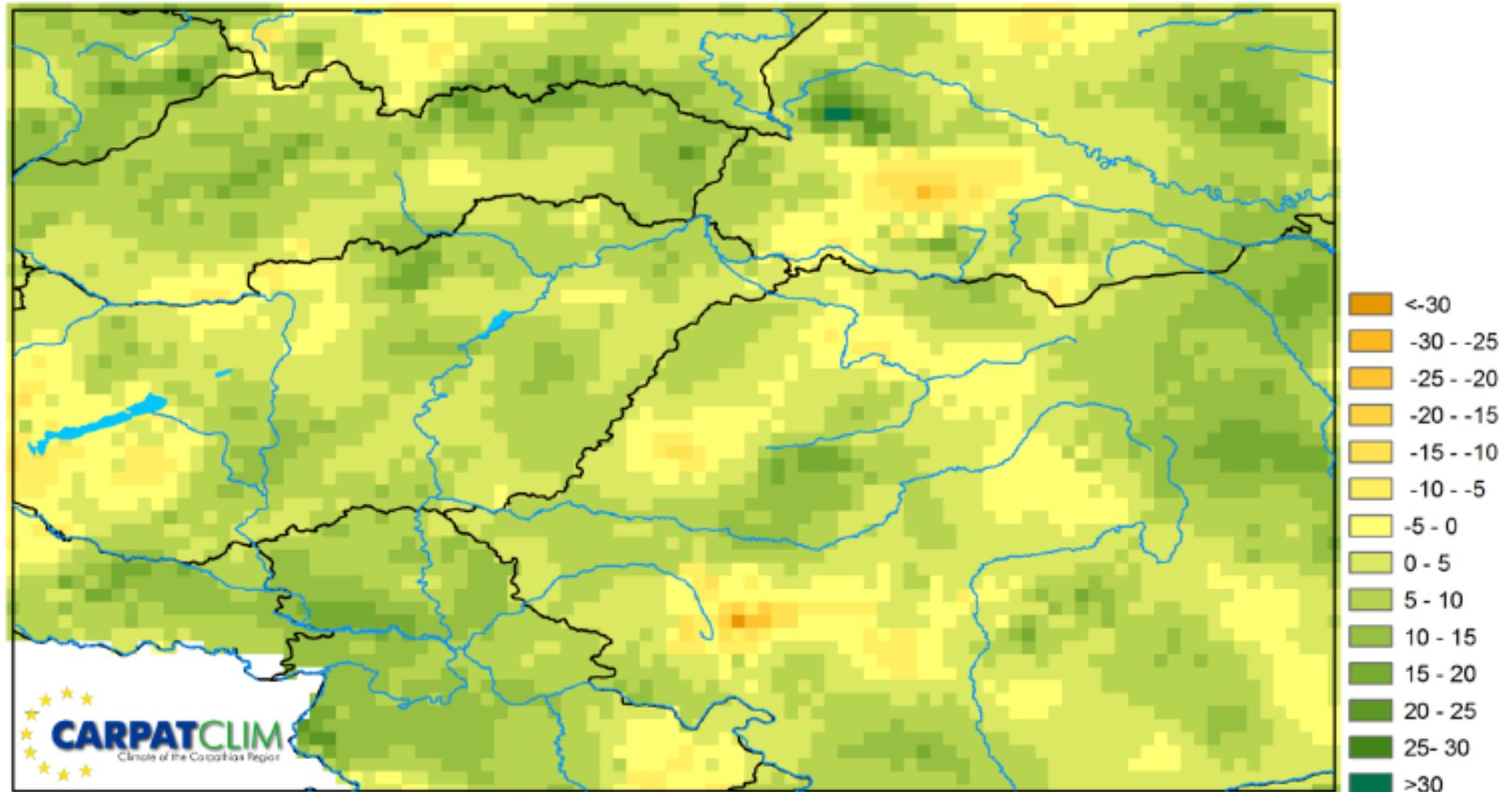
Change in the number of wet days 1961-2010



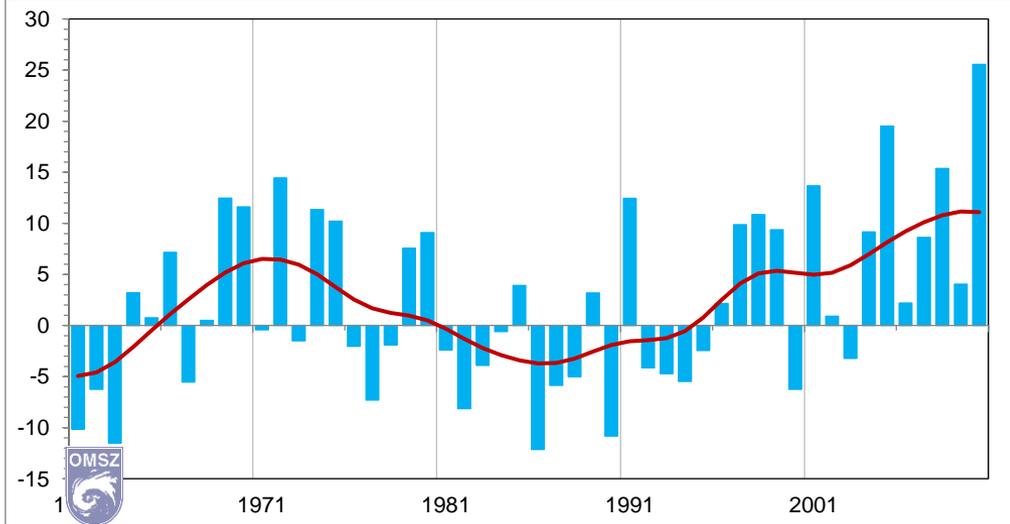
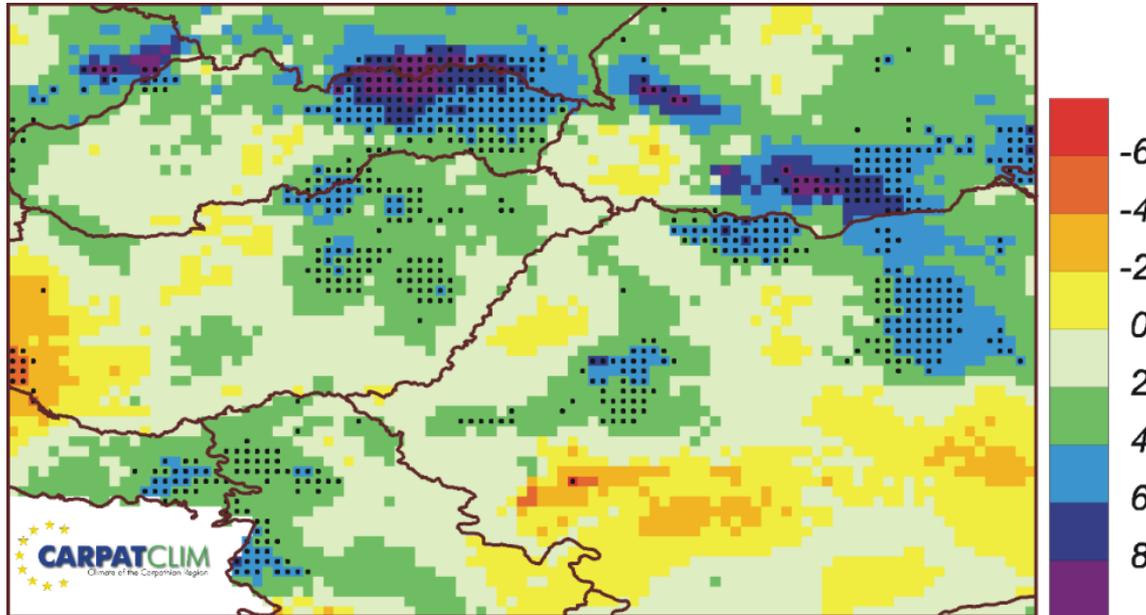
Change in the number of days with precipitation above 20 mm, 1961-2010



Change in the maximum daily precipitation sum, 1961-2010

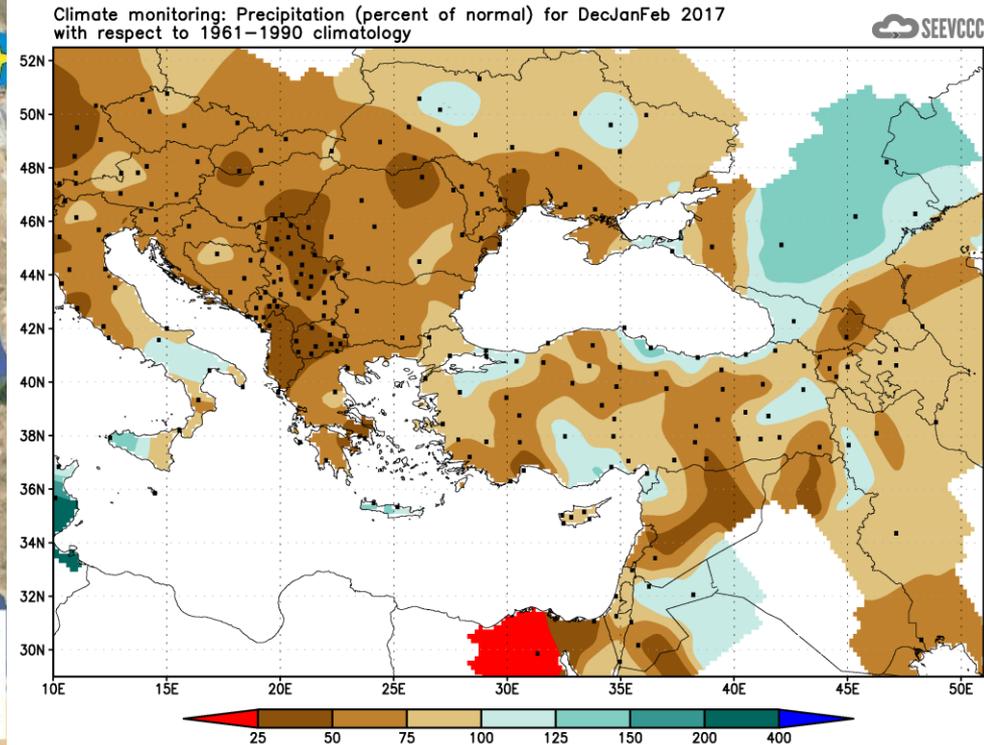
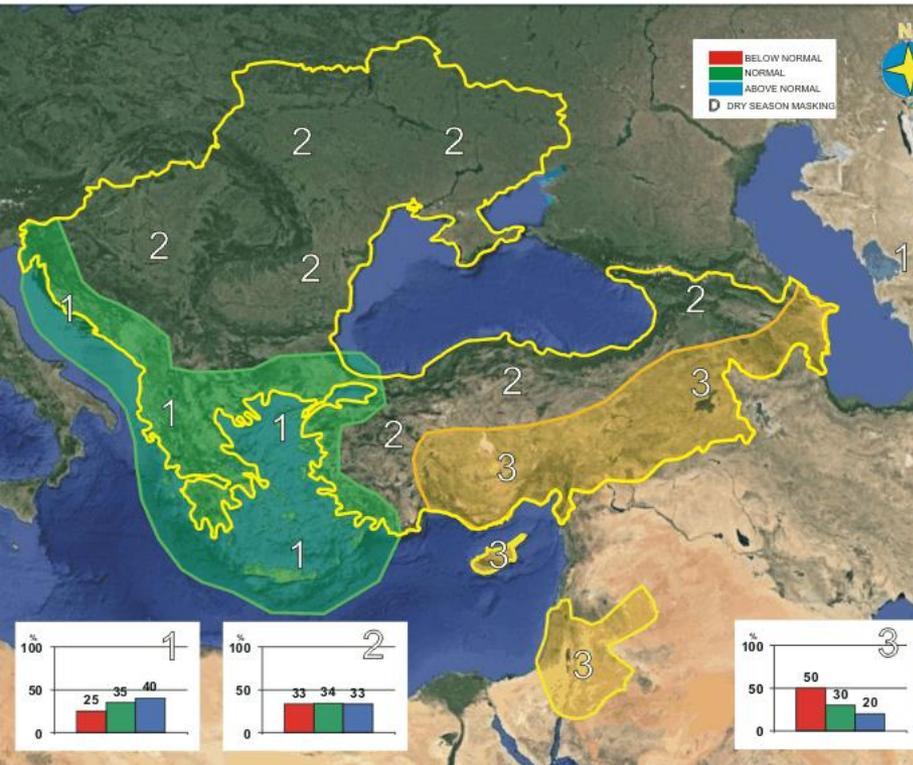


Maximum 5 days precipitation sum



Forecasts

2016/17 winter precipitation outlook and observation

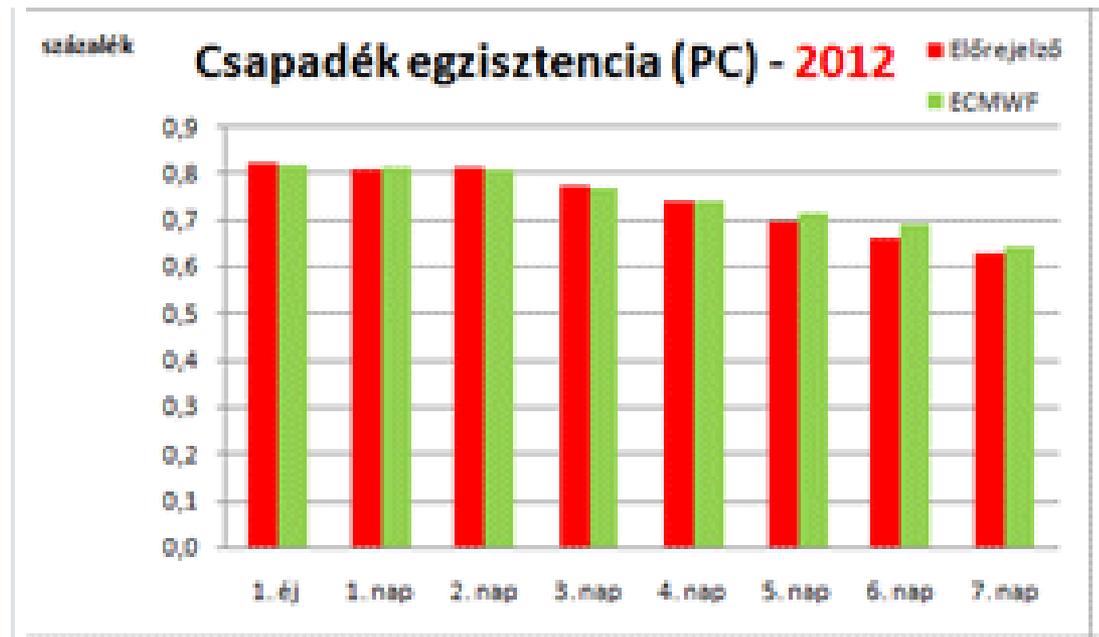


Seasonal forecast, WMO, SEECOF, 2017

2016/2017 winter seasonal forecast and observations

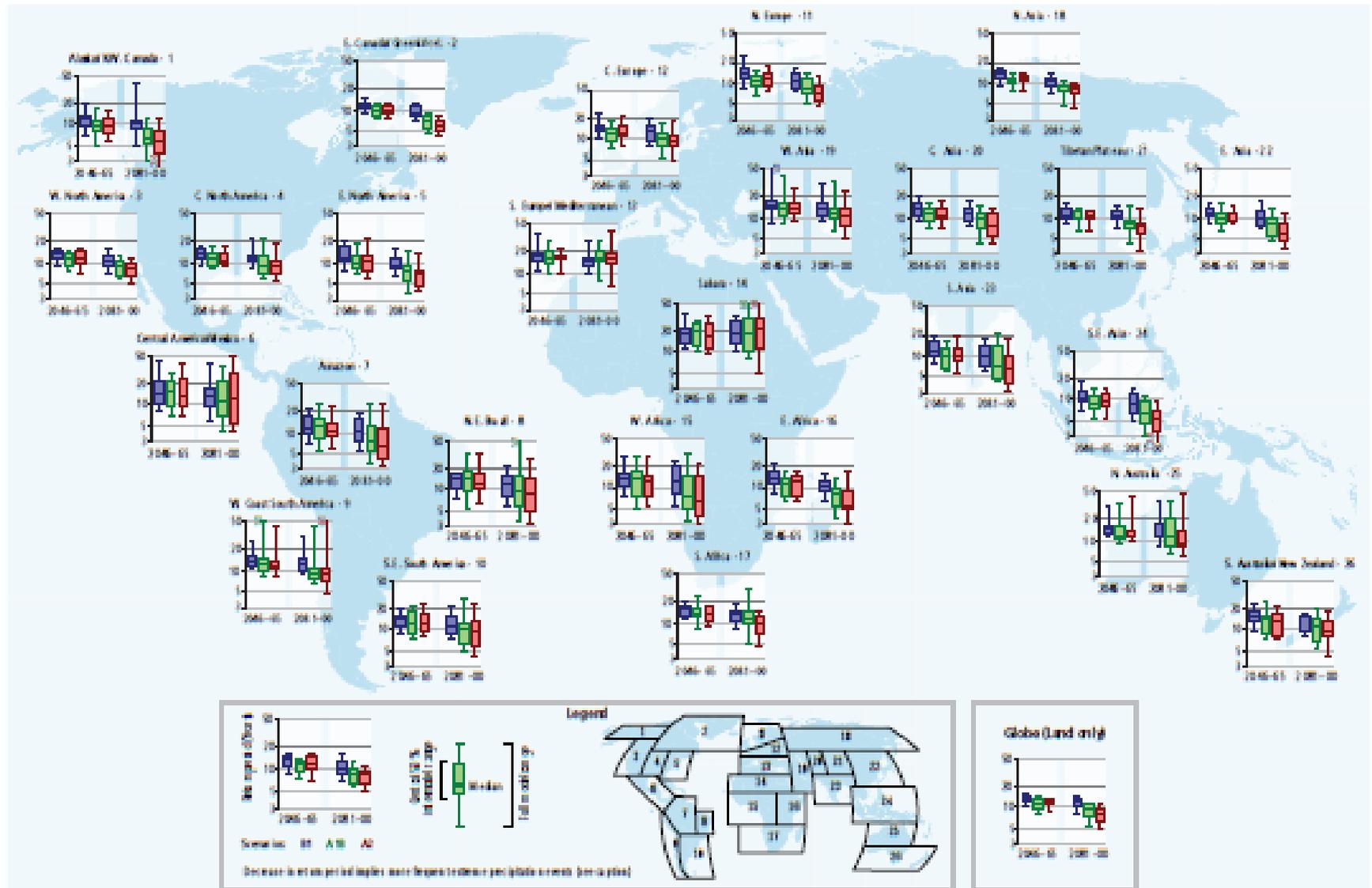
	Temperature observed	Temperature outlook	Precipitation observed	Precipitation outlook
Greece (2)	Below normal	Above normal	drier than normal, wetter than normal in Crete	Below normal (25) Normal (35) Above normal (40)
Serbia (1,5)	Below normal in almost entire Serbia	Near-normal (30, 40, 30) in entire Serbia	Below normal in entire Serbia	No predictive signal (33, 34, 33) in entire Serbia
Ukraine (1,5)	Normal (46%) and cold (54%)	Near-normal (30, 40, 30) in entire Ukraine	Normal (46%) Below normal (27%) above normal (27%)	No predictive signal (33, 34, 33) in entire Ukraine
Croatia (5)	Normal	Above normal at the Adriatic coast, interior of Dalmatia and mountain region (Gorski kotar and Lika) Normal (remaining part of Croatia)	Normal (part of the Northern Adriatic, the wider area of the town of Knin, part of the Southern Adriatic as well as Eastern Croatia) Below normal (in the remaining part of Croatia)	Normal or above normal (the Adriatic coast and its hinterland and mountainous part of Croatia) No predictive signal (North and East part of Croatia)

Shorter term forecasts on existing precipitation (green: ECMWF model, red: forecaster)

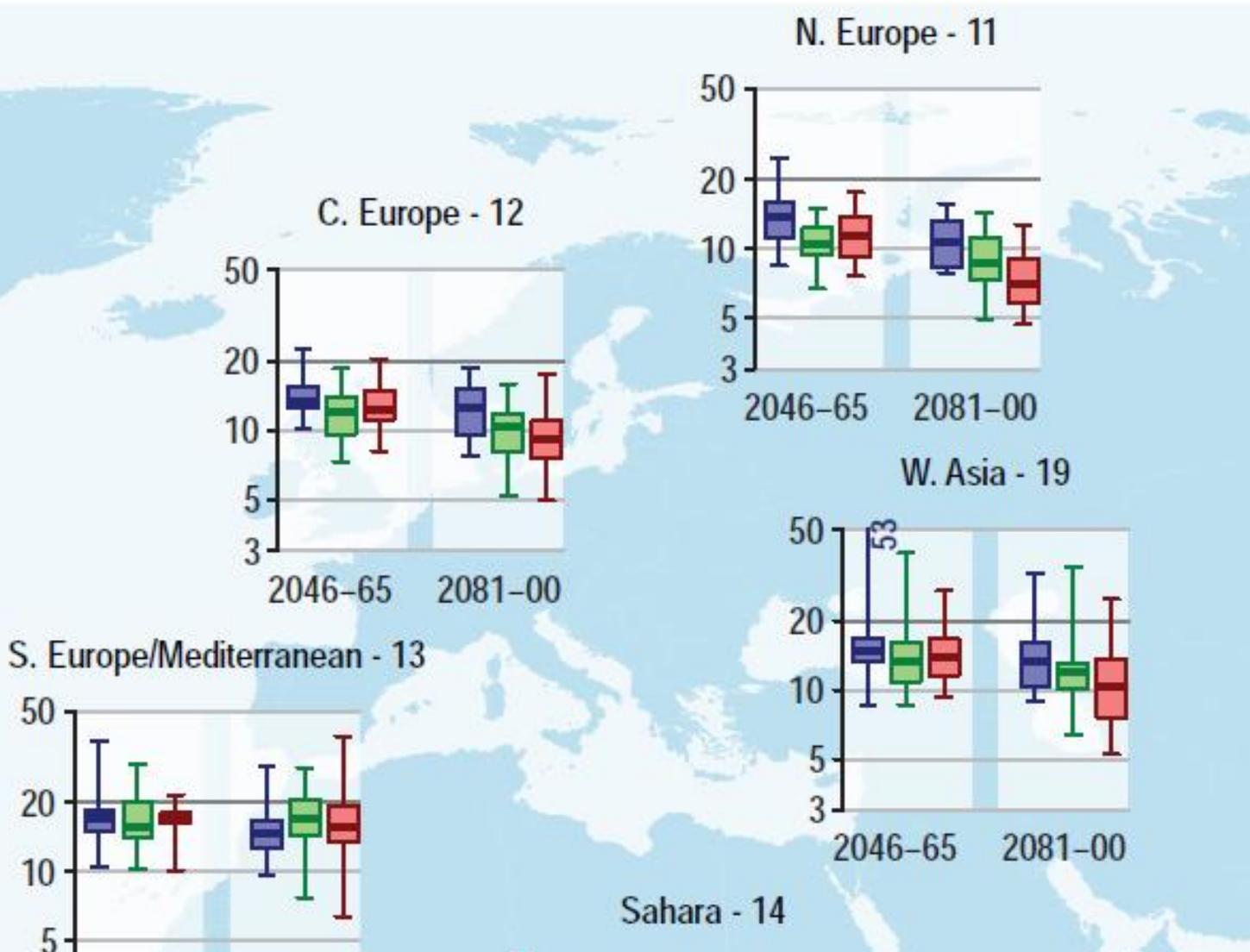


Climate projections IPCC, 2012

Changes in the return period of 20-year daily precipitation



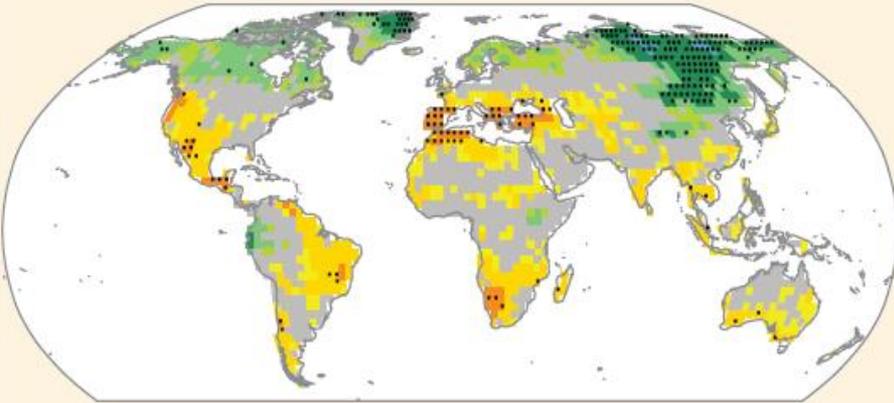
Changes in the return period of 20-year daily precipitation, Europe



Changes in projected dryness

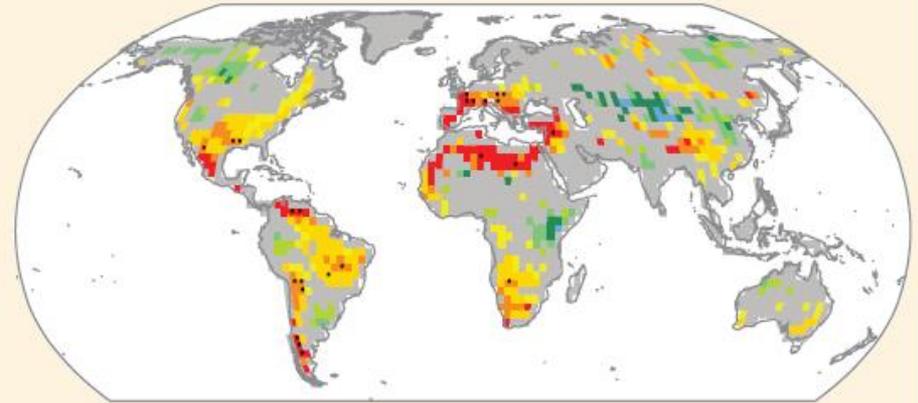
Consecutive dry days (CDD)

2046-2065 (ANN)

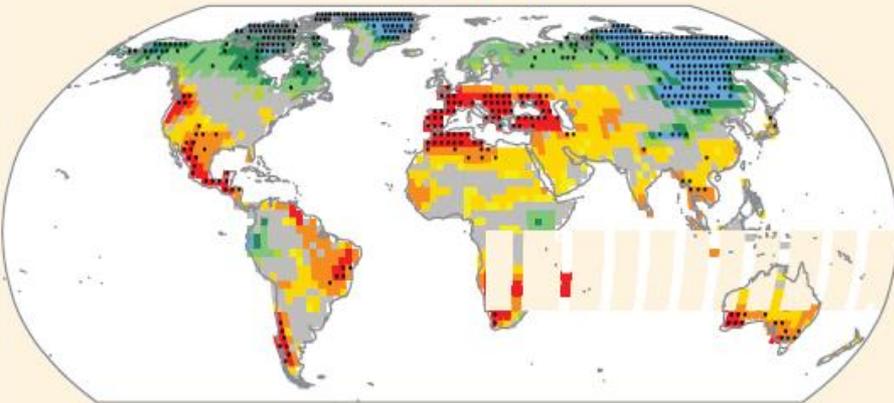


Soil moisture anomalies (SMA)

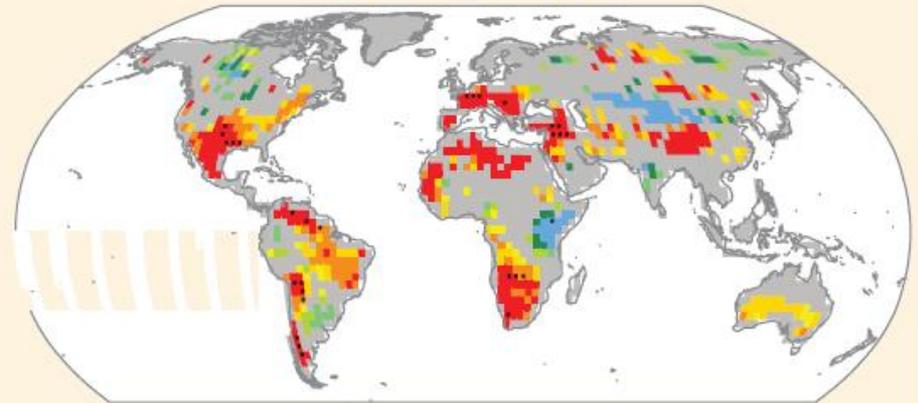
2046-2065 (ANN)



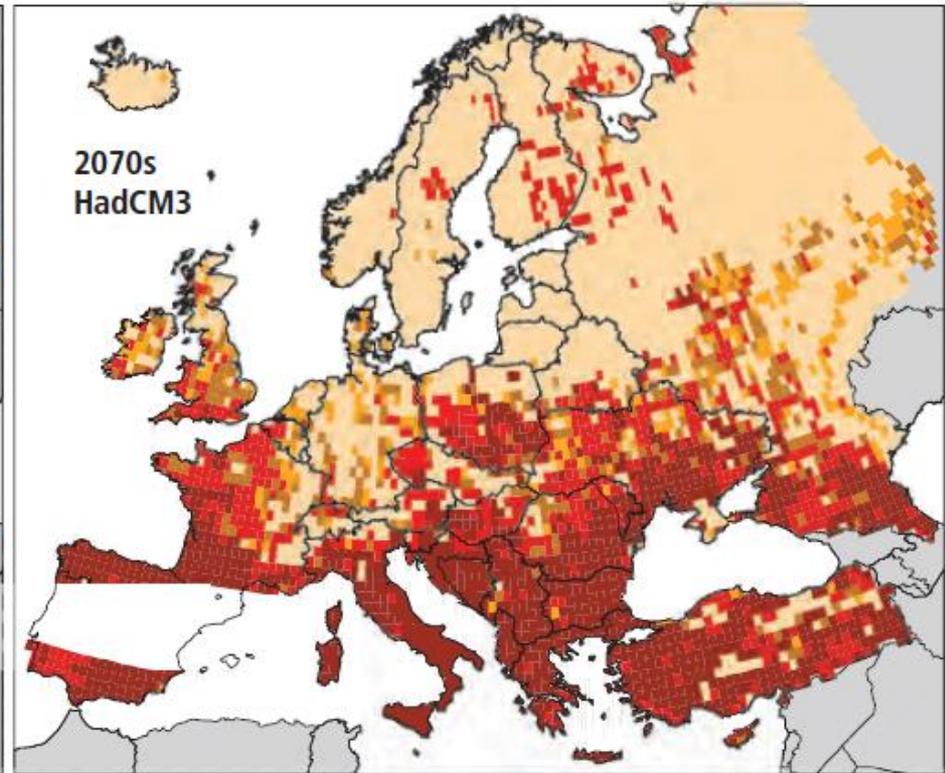
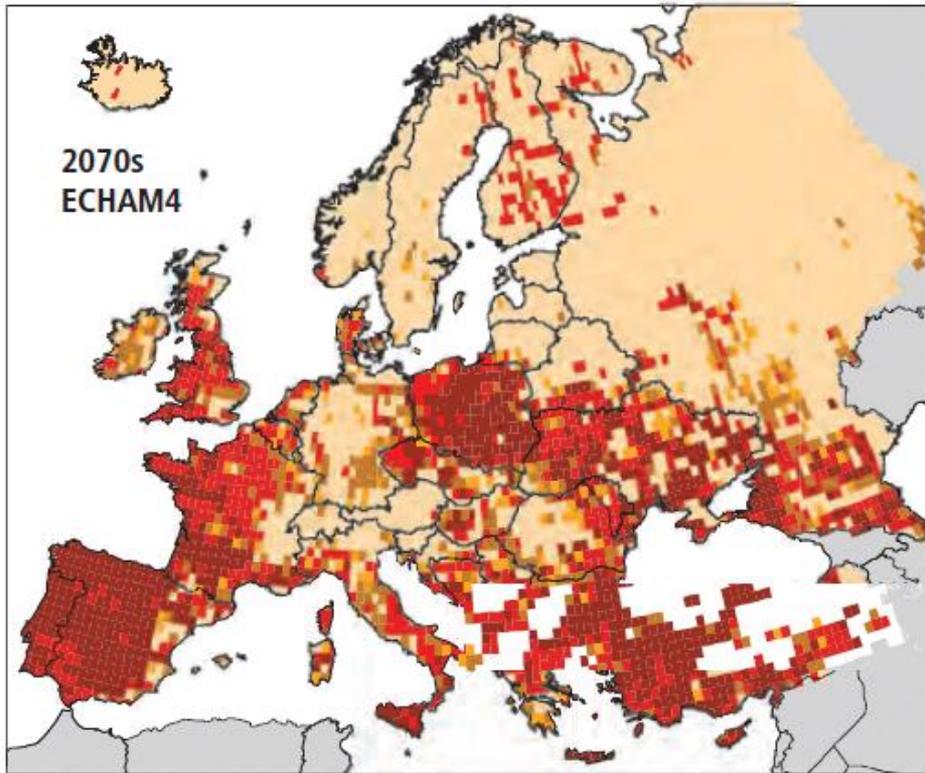
2081-2100 (ANN)



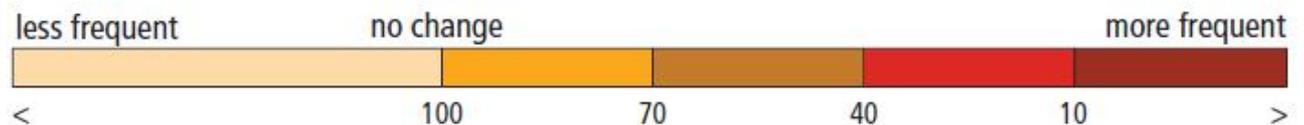
2081-2100 (ANN)



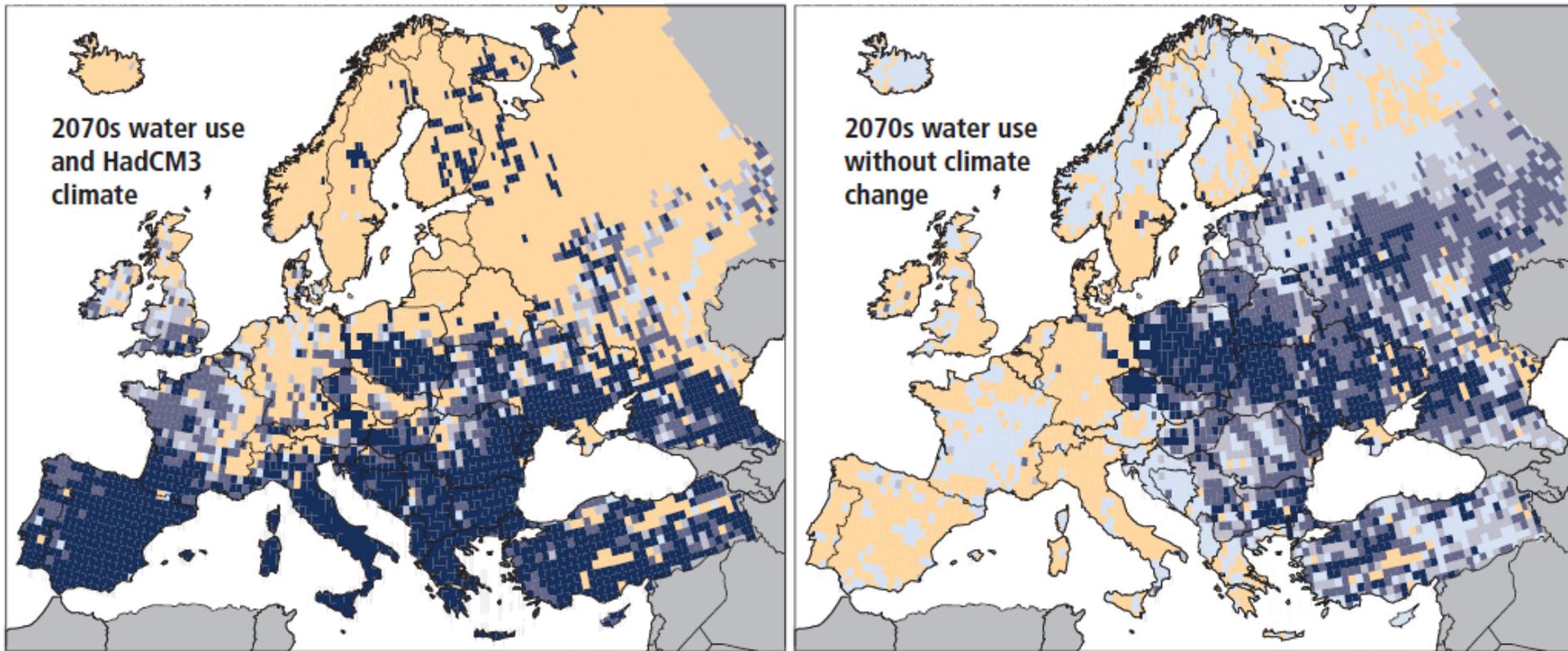
Changes in the 100-year return period



Future return period [years] of
droughts with an intensity of today's
100-year events:



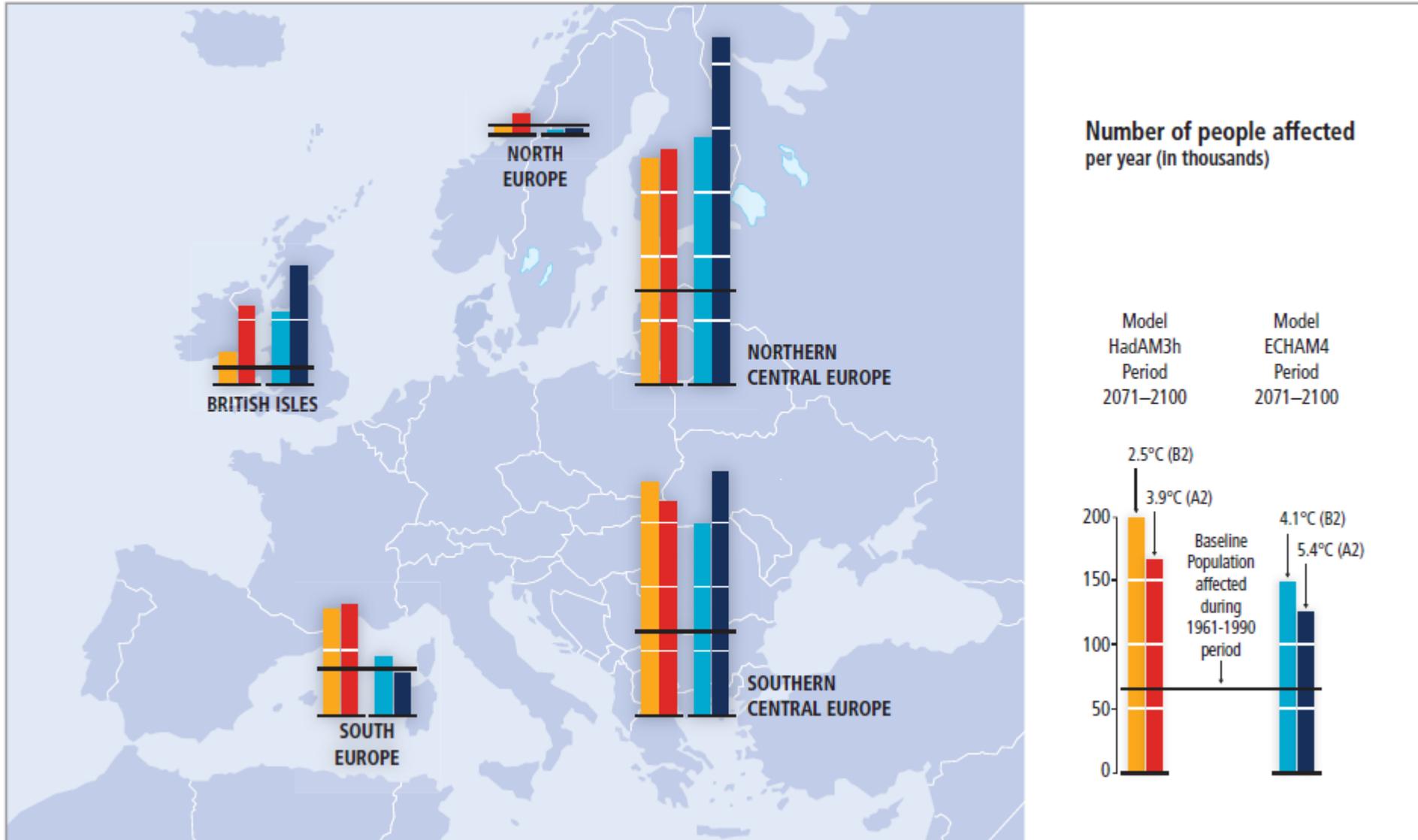
Changes of intensity of 100-year drought (%)



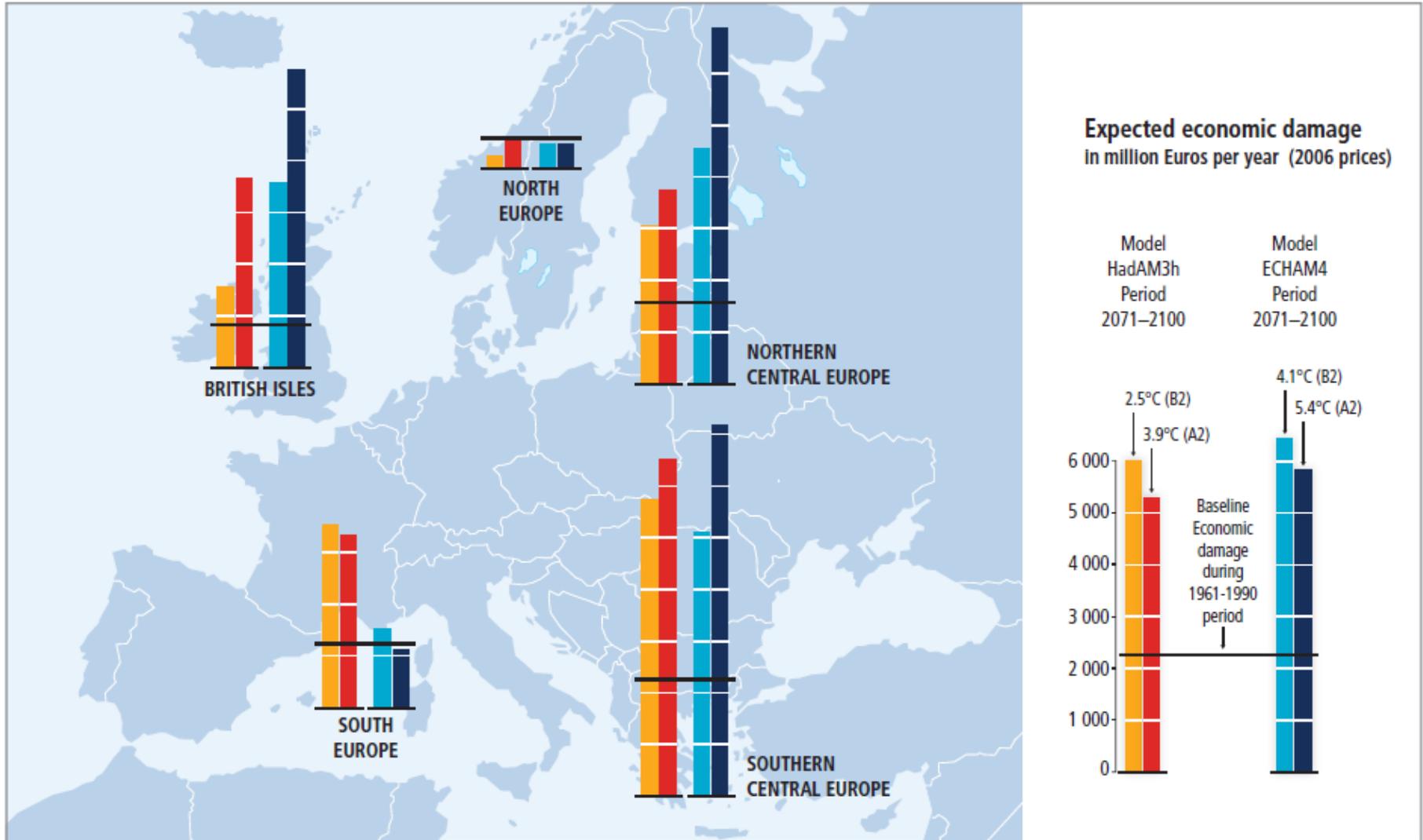
Future change [%] in intensity (deficit volume) of 100-year droughts:



Impact of flood on the inhabitants



Expected economic damages of floods



Conclusions

- The observed and projected trends do not fit in many cases
- Further increase in extreme events is expected
- Further model developments are requested
- Monitoring management has to be improved
- Danube region is among the most affected regions, first of all in Europe

Thank you for your attention!