

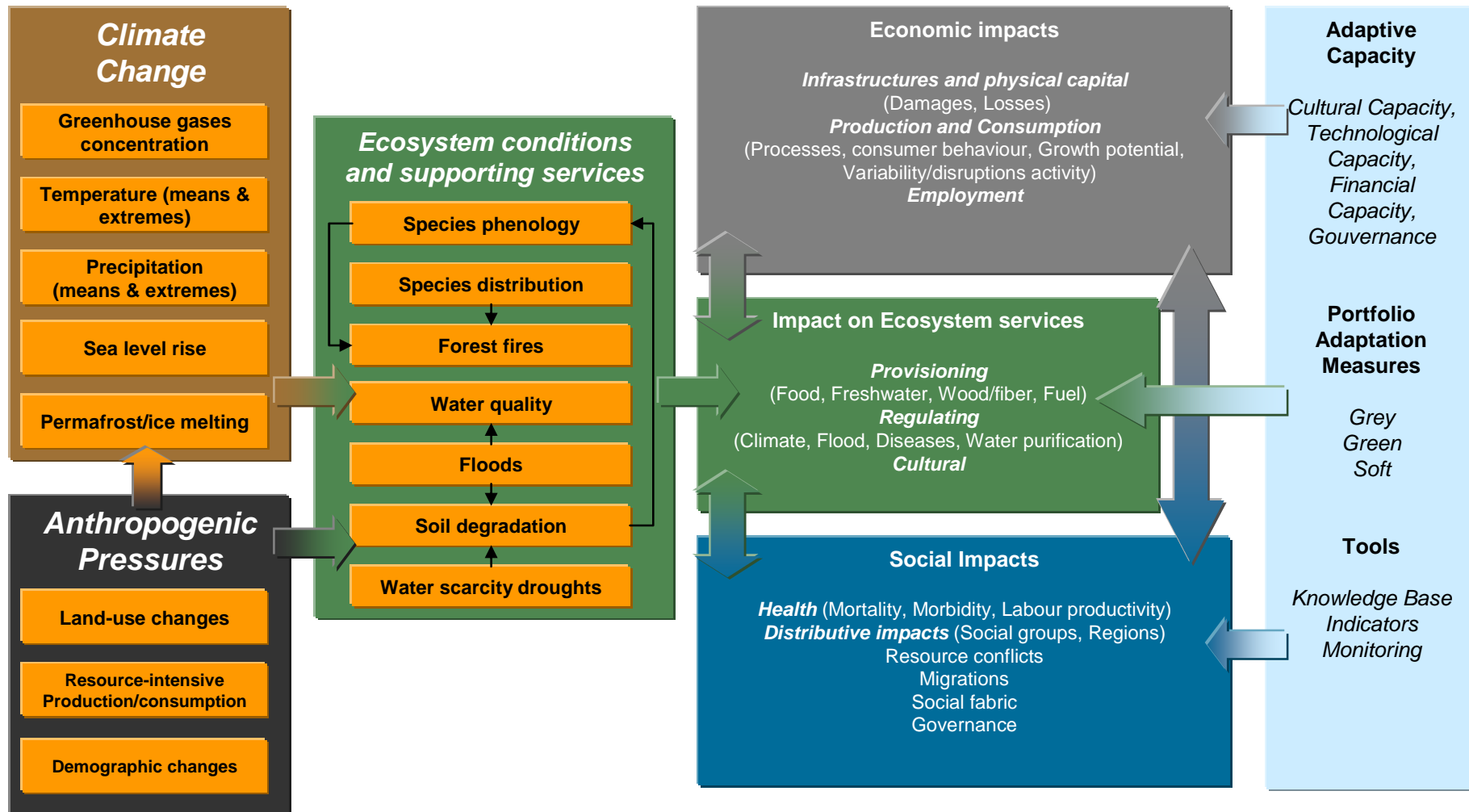
Cooperations on climate change in the Carpathian region

Sandor Szalai

szalai.sandor@mkk.szie.hu

Environmental pathway of vulnerability and adaptation

Jacques Delsalle, Evdokia Achilleos, DG Environment, Unit D1 – Protection of Water Resources



CARPATCLIM results

- High-resolution (10 km*10 km) freely available databases
- Data availability on monthly and daily level
- Time frame: 1961-2010
- www.carpatclim-eu.org

Territory of the project

- For the production of the digital climate atlas, the resulting climatological grids should cover the area between latitudes 50°N and 44°N , and longitudes 17°E and 27°E , approximately.

Map



Countries of the Carpathian Region

Country	Area in sq. km
Croatia	14 662,66
Czech Rep.	17 570,58
Hungary	86 996,47
Poland	19 794,32
Serbia	45 015,09
Slovakia	48 520,49
Bulgaria	1 208,63
Moldova	437,90
Romania	184 434,63
Ukraine	71 530,71

Philosophy of CARPATCLIM

- No common database of raw data
- Each country provide the same work (hope for the availability of most possible data)
- Common softwares
- National and international consistency
- Near border data exchange (minimum number of data exchanged on equal basis)

Participants

- Leading organisation: Hungarian Meteorological Service
- Participants:
(Hydro)meteorological institutes and services of Austria, Croatia, Czech Republic, Poland, Serbia, Slovakia, Ukraine
National Research and Development Institute of Environmental Protection of Romania
Szent Istvan University from Hungary

Structure

- Module 1: Data rescue, quality control, and data homogenisation by the use of MASH. (Leader: SHMU)
- Module 2: Data harmonisation and gridded datasets by the use of MISH. (Leader: OMSZ)
- Module 3: Climate Atlas, publicly accessible dedicated web site, gridded climatological datasets and searchable metadata catalogue (Leader: RHMSS)

Data rescue

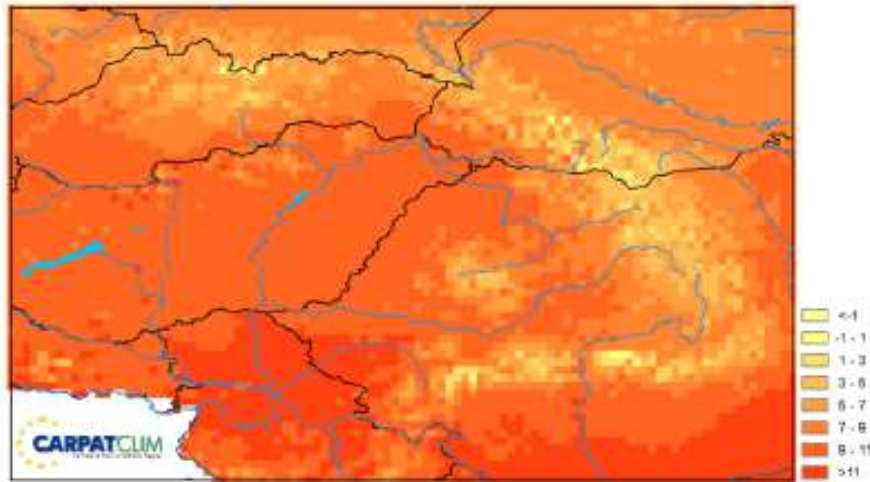
Country	Nb. of digitalized dat
Croatia	0
Czech Republic	0
Hungary	1 303050
Poland	389455
Romania	1525700
Serbia	107100
Slovakia	394200
Ukraine	9 964 500

Set of meteorological variables in daily temporal resolution to be provided

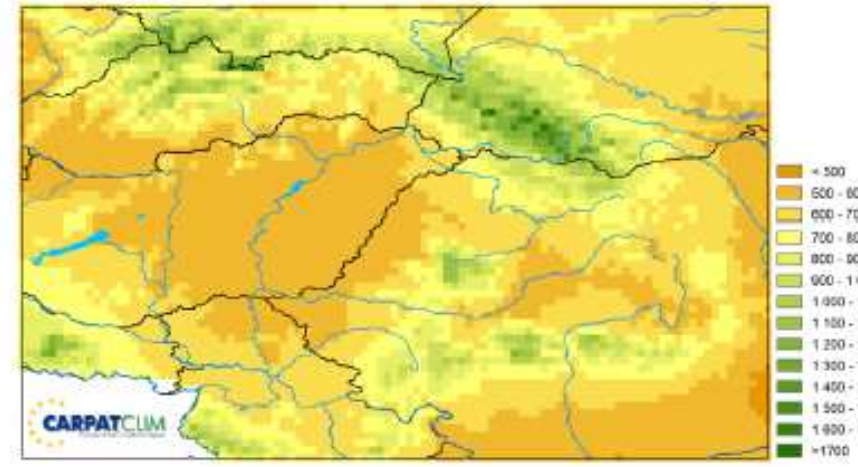
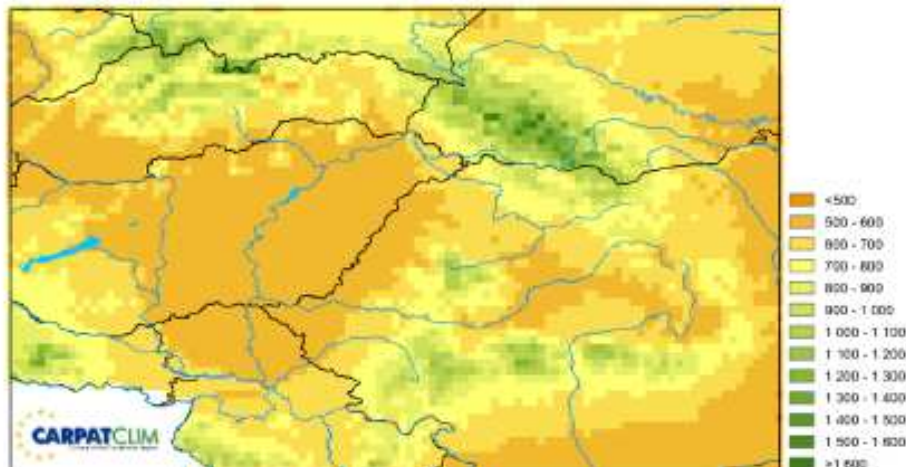
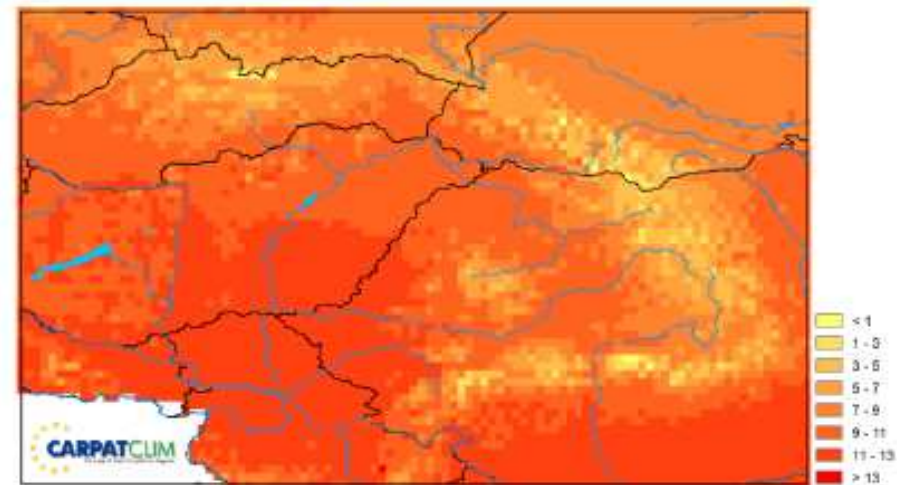
Acronym	Variable	Unit	Measured	Homogenized	From	Analyzed
CC	Cloud Cover	<i>tenths</i>	x	x		x
PA	Surface Air Pressure	<i>mbar</i>	x	x		x
RH	Relative Humidity	%	x	x		x
VP	Surface Vapour Pressure	<i>hPa</i>		x	TN,TX,RH	
RR	Precipitation	<i>mm</i>	x	x		x
SS	Sunshine Duration	<i>hrs</i>	x	x		
RS	Relative Sunshine Duration	-			SS	x
GR	Global Radiation	<i>MJ/m²</i>		x	SS	
TN	Minimum Temperature	<i>°C</i>	x	x		x
TM	Mean Temperature	<i>°C</i>			TN,TX	x
TX	Maximum Temperature	<i>°C</i>	x	x		x
DTR	Temperature Range	<i>°C</i>			TN,TX	x
WS10m	Wind Speed at 10 m	<i>m/s</i>	x	x		
WS2m	Wind Speed at 2 m	<i>m/s</i>			WS10m	x
WDu,v	Wind Direction(s)	<i>deg</i>	x	x		
WG	Wind Gust	<i>m/s</i>	x	x		
SD	Snow Depth	<i>cm</i>	(x)		model	
SW	Snow Water Equivalent	<i>cm</i>	(x)		model	

Temperature and precipitation averages

1961-90



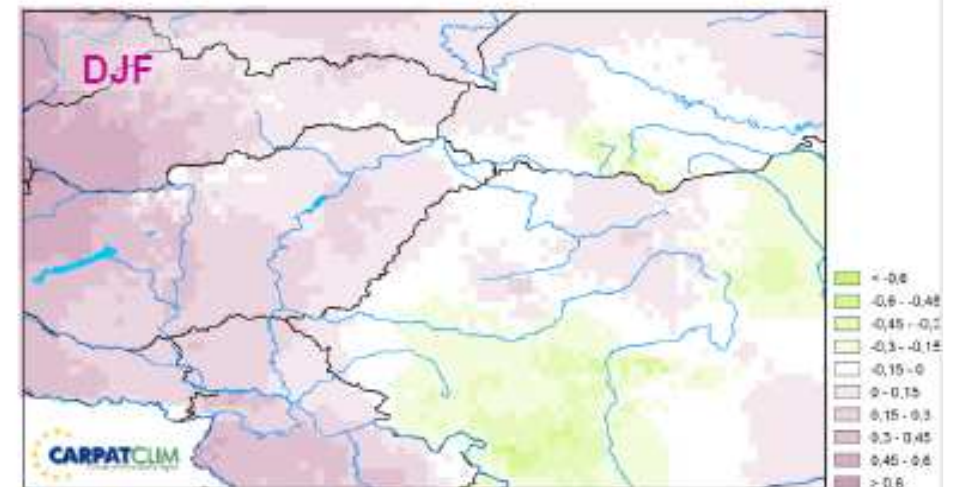
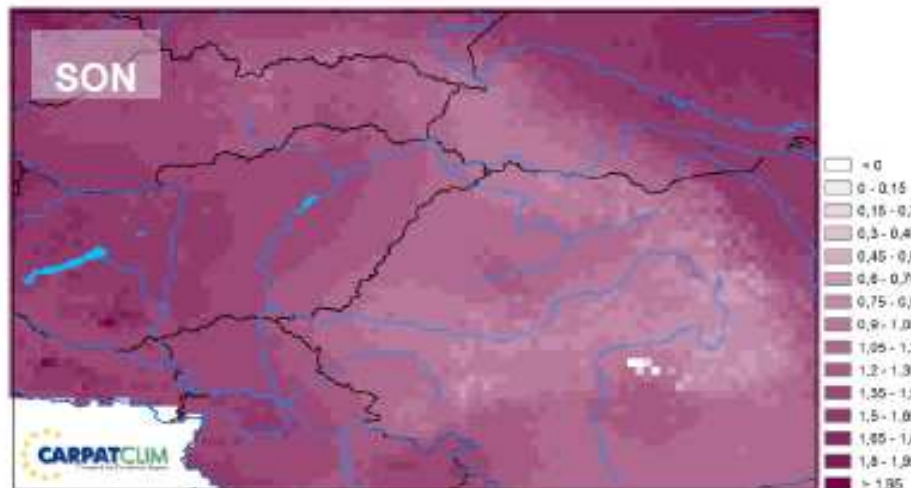
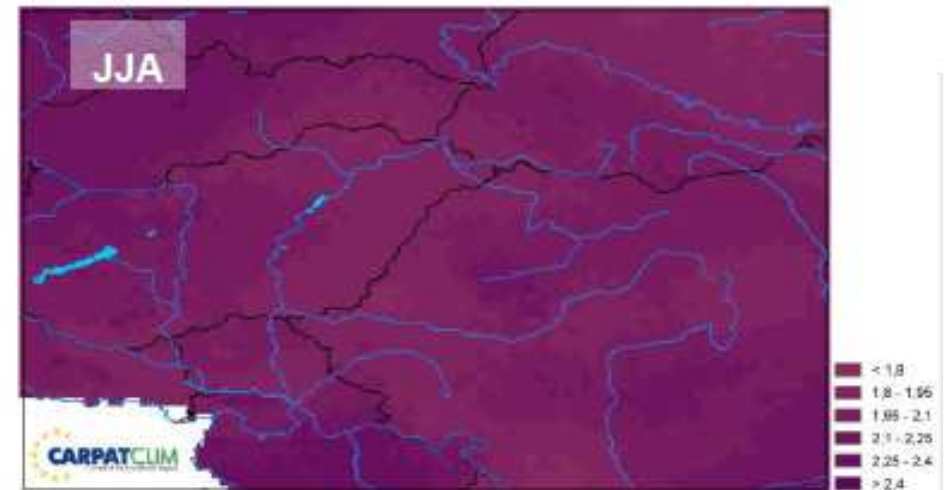
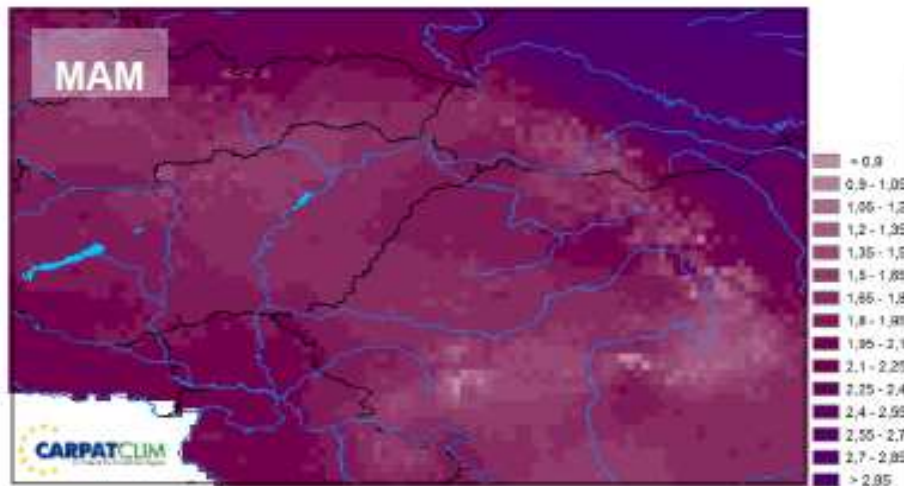
1981-2010



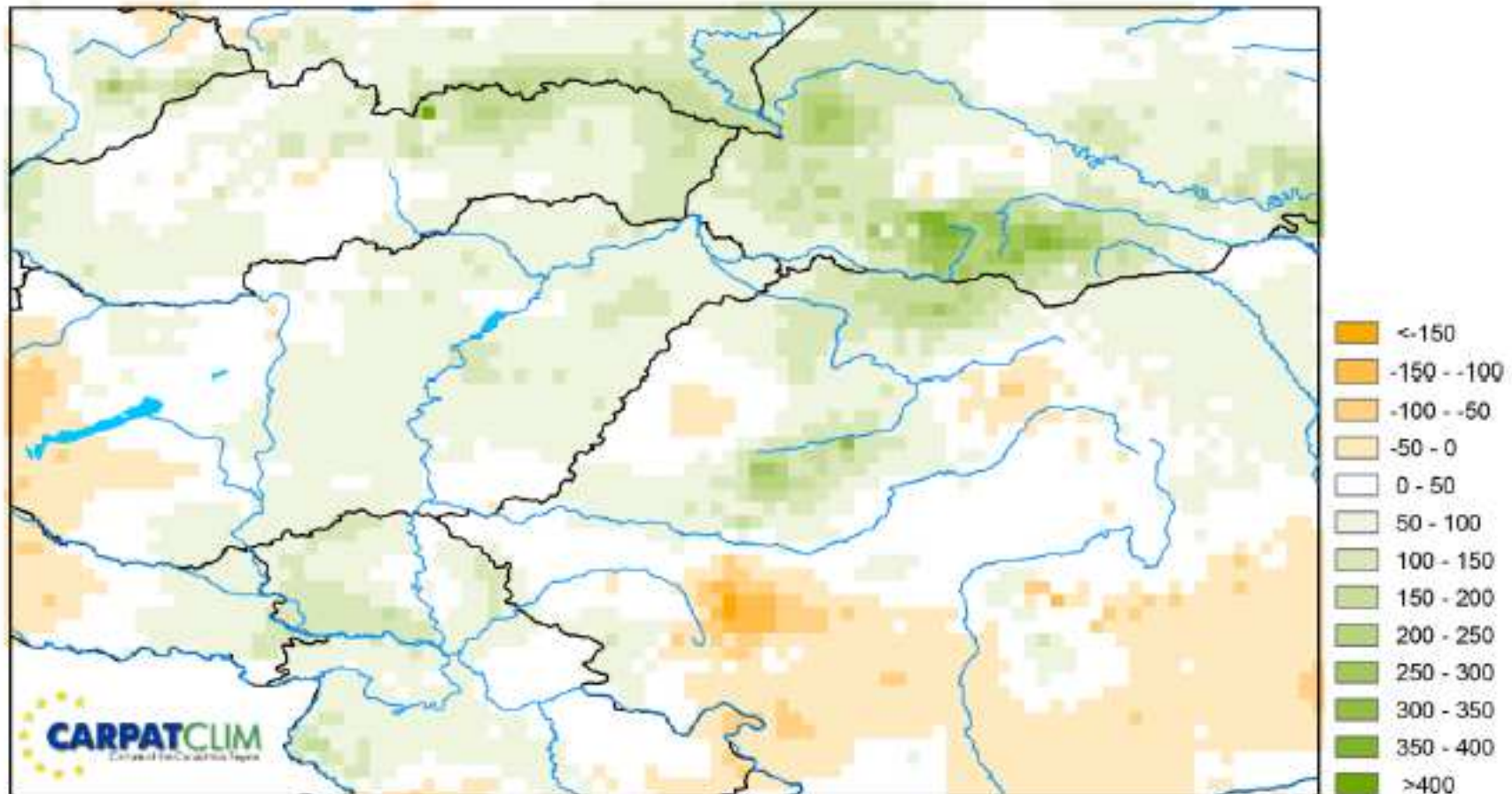
(Lakatos et al., 2013)

Seasonal temperature changes, 1961-20

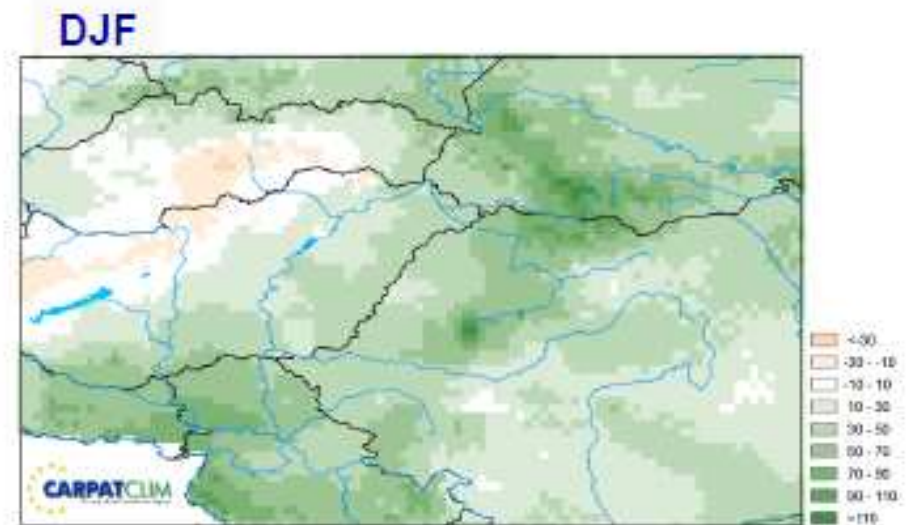
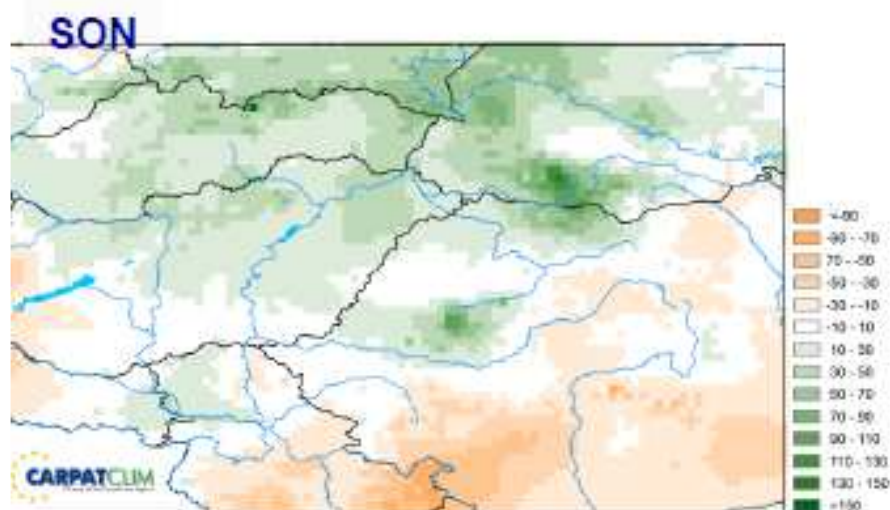
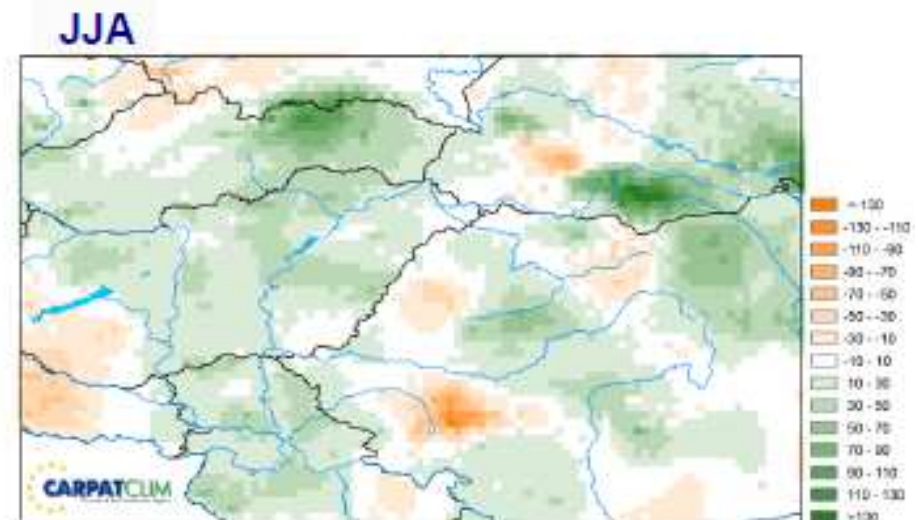
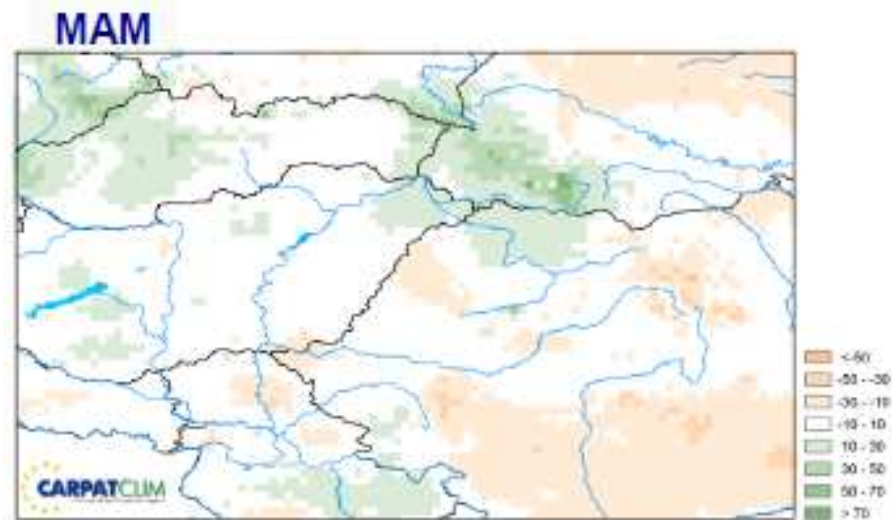
(Lakatos et al., 2013)



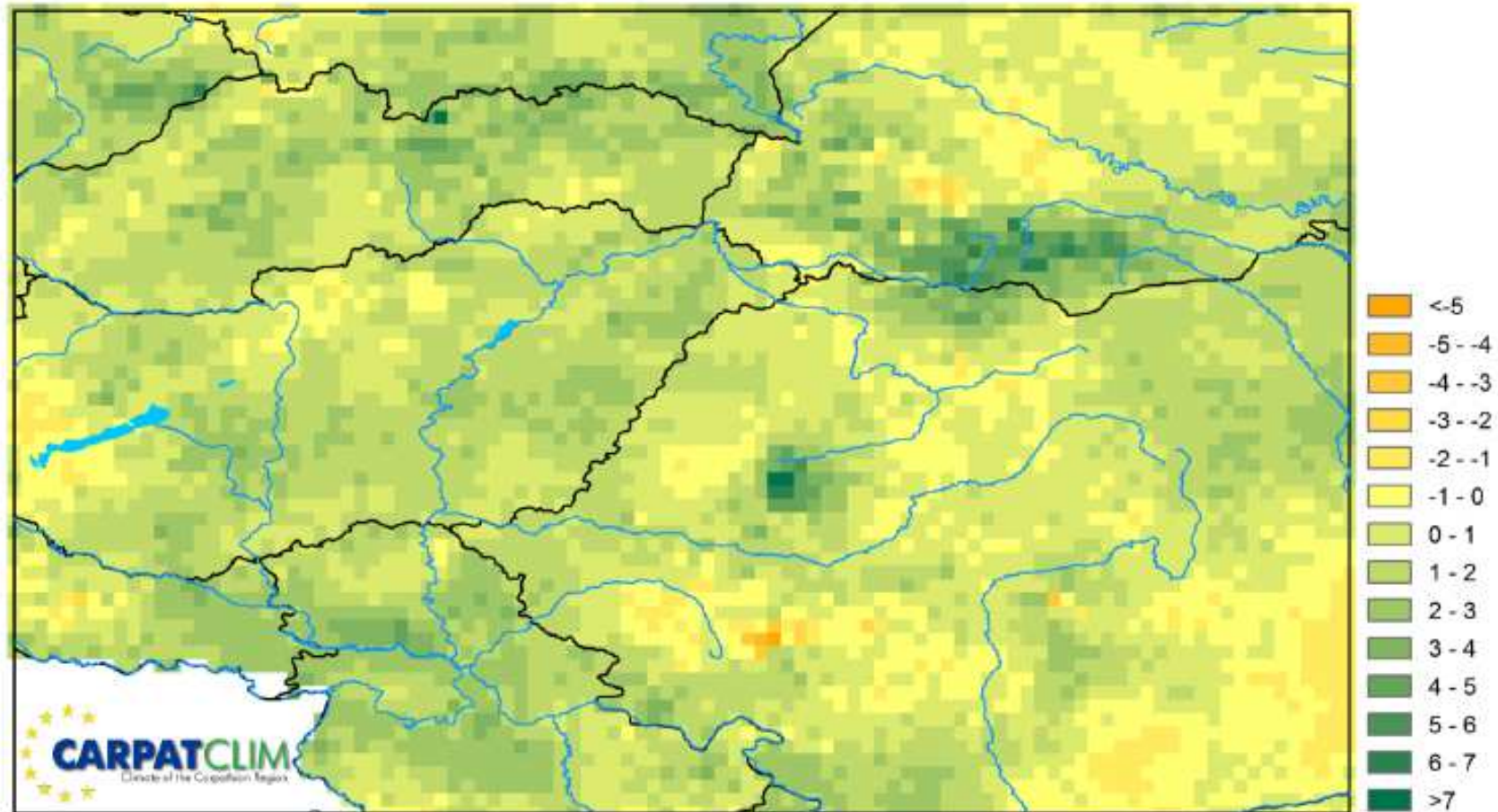
Change of the annual precipitation sum 1961-2010



Change of the seasonal precipitation sums 1961-2010



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



Benefits

- Development possibilities in the agriculture, hydrology and forestry
- Modelling possibilities for spatial distribution of species
- Strong development in the climate change impact and adaptation studies
- Damage estimation, crop-yield forecast
- Development of early warning systems
- More accurate determination of crop sites
- Choosing of production sites, etc.

Plans

- Large work
- Should be enlarged:
 - Spatial
 - Temporal
 - Thematically

Acknowledgement

- Author thanks to European Commission, Joint Research Centre, Institute for Environment and Sustainability, Ispra, Italy for Contract Notice OJEU 2010/S 110-166082 dated 9 June 2010

Thank you for your attention!