

# Climate of the Carpathian region

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# Status

- Increasing needs for good quality regional/subregional databases
- Several attempts:
  - Gridded datasets:
    - dynamical modelling
    - statistical modelling
  - Raw data
    - regional climate centres
    - specific databases

# Problem

- Less studied regions
  - Carpathians
  - Southeastern-Europe
- Smaller countries mostly with complex topography
- Specific effects of the Carpathian region, like summer drying

# Location



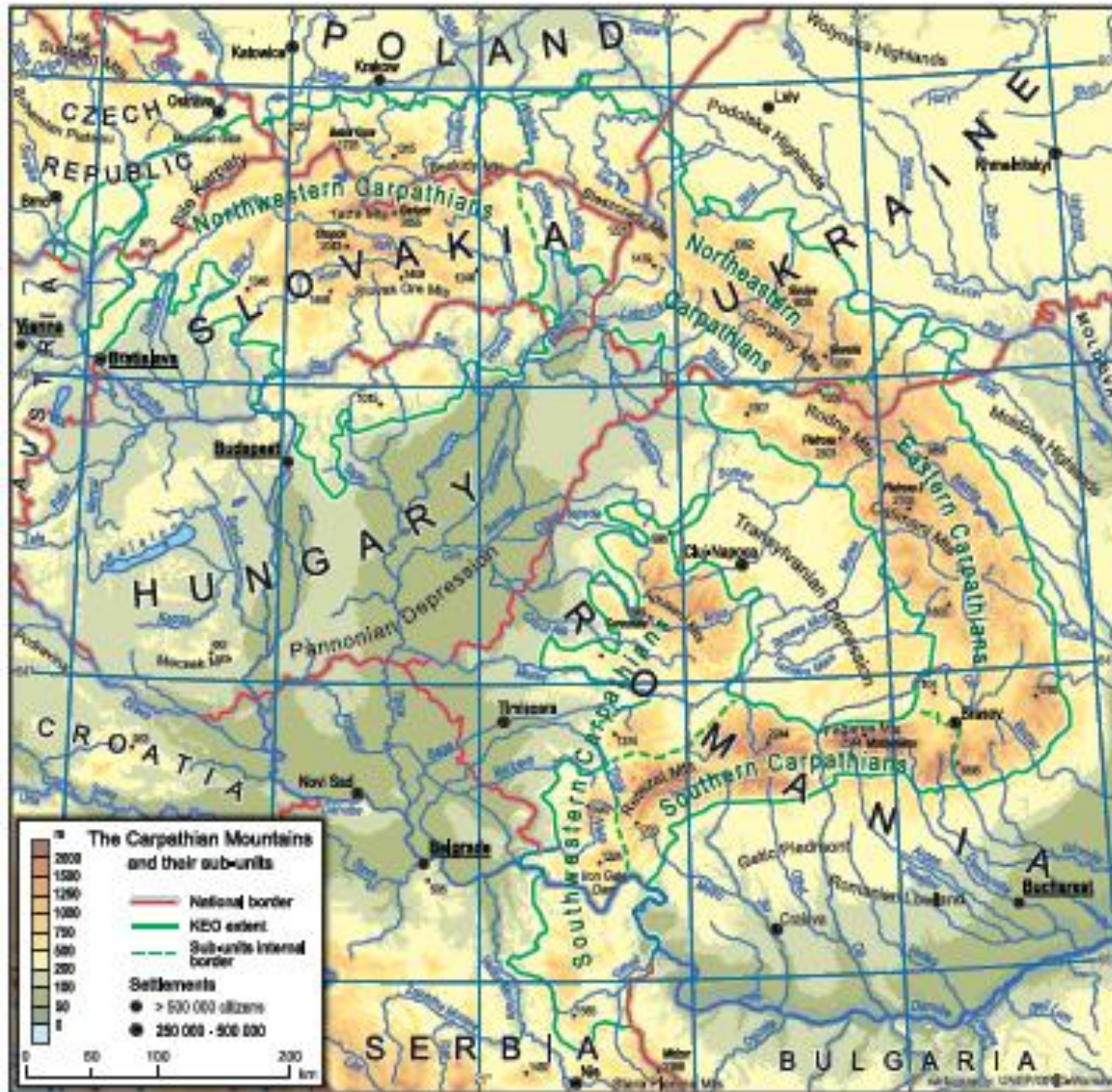
# Carpathians

- Length about 1500 km, second longest in Europe
- Highest peak is 2655 m
- Area is 190000 km<sup>2</sup>
- Area of the project is about 500000 km<sup>2</sup> (appr. the territory of Spain)

# Territory of the project

- For the production of the digital climate atlas, the resulting climatological grids should cover the area between latitudes  $50^{\circ}\text{N}$  and  $44^{\circ}\text{N}$ , and longitudes  $17^{\circ}\text{E}$  and  $27^{\circ}\text{E}$ , 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



# Background of the project

- Hungarian initiative in the Environmental Committee at the European Parliament in 2008
- Accepted by the Economical Committee and the Plenary in 2008
- Preparation of the tender by DG Environment and JRC Ispra in 2009
- Call in June 2010
- Duration of the project:  
22 December 2010 - 22 December 2012

# Philosophy of CARPATCLIM

- No common database of raw data
- Each country provide the same work (hope for a network as dense as possible for the project)
- Common software
- 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

2 m mean daily air temperature,

minimum air temperature,

maximum air temperature

precipitation

10 m wind direction

10 m horizontal wind speed

sunshine duration

cloud cover

global radiation

relative humidity

surface vapour pressure

surface air pressure

snow depth

# Set of variables and indicators to be provided for the Digital Climate Atlas of the Carpathian Region

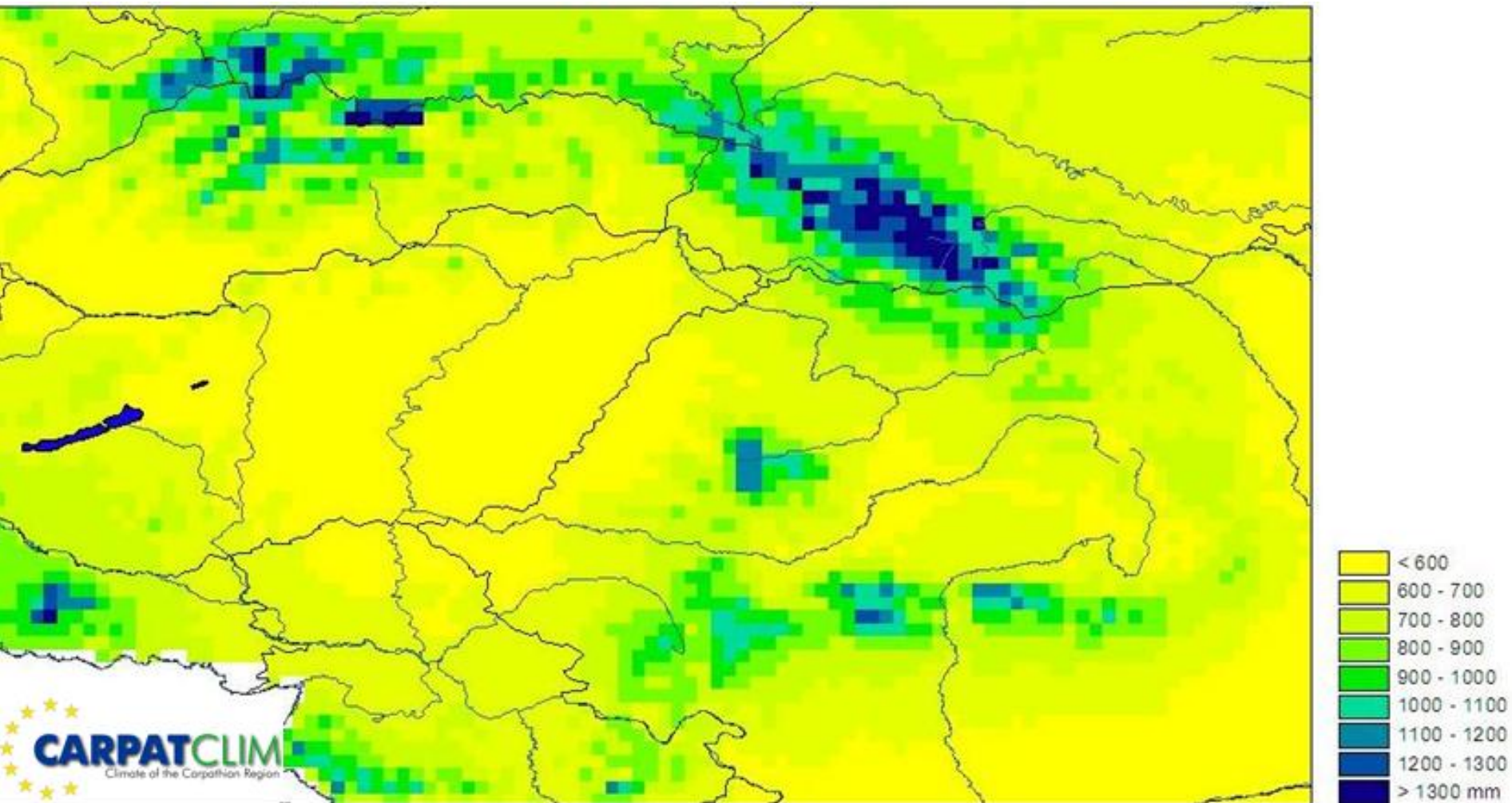
Average air temperature (2 m), average mean air temperature (2 m), minimum air temperature, maximum air temperature, precipitation, maximum 10 m horizontal wind speed, average 10 m horizontal wind speed, sunshine duration, cloud cover, global radiation, relative humidity, vapour pressure, surface air pressure, snow depth, snow water equivalent, number of frost days, number of days with T<sub>max</sub> above 25 °C, number of days with T<sub>max</sub> above 30 °C, Palfai Drought Index, Standardized Precipitation Index averaged over a three-months period, Reconnaissance Drought Index, Palmer Drought Severity Index, percentage of days without defrost (ice days), percentage of extremely hot days, percentage of severe cold days, growing season length, percentage of wet days, percentage of wet days above 20 mm/d, greatest 1-day total rainfall, greatest 5-day total rainfall, aridity index, moisture index, Ellenberg index

# Outcomes

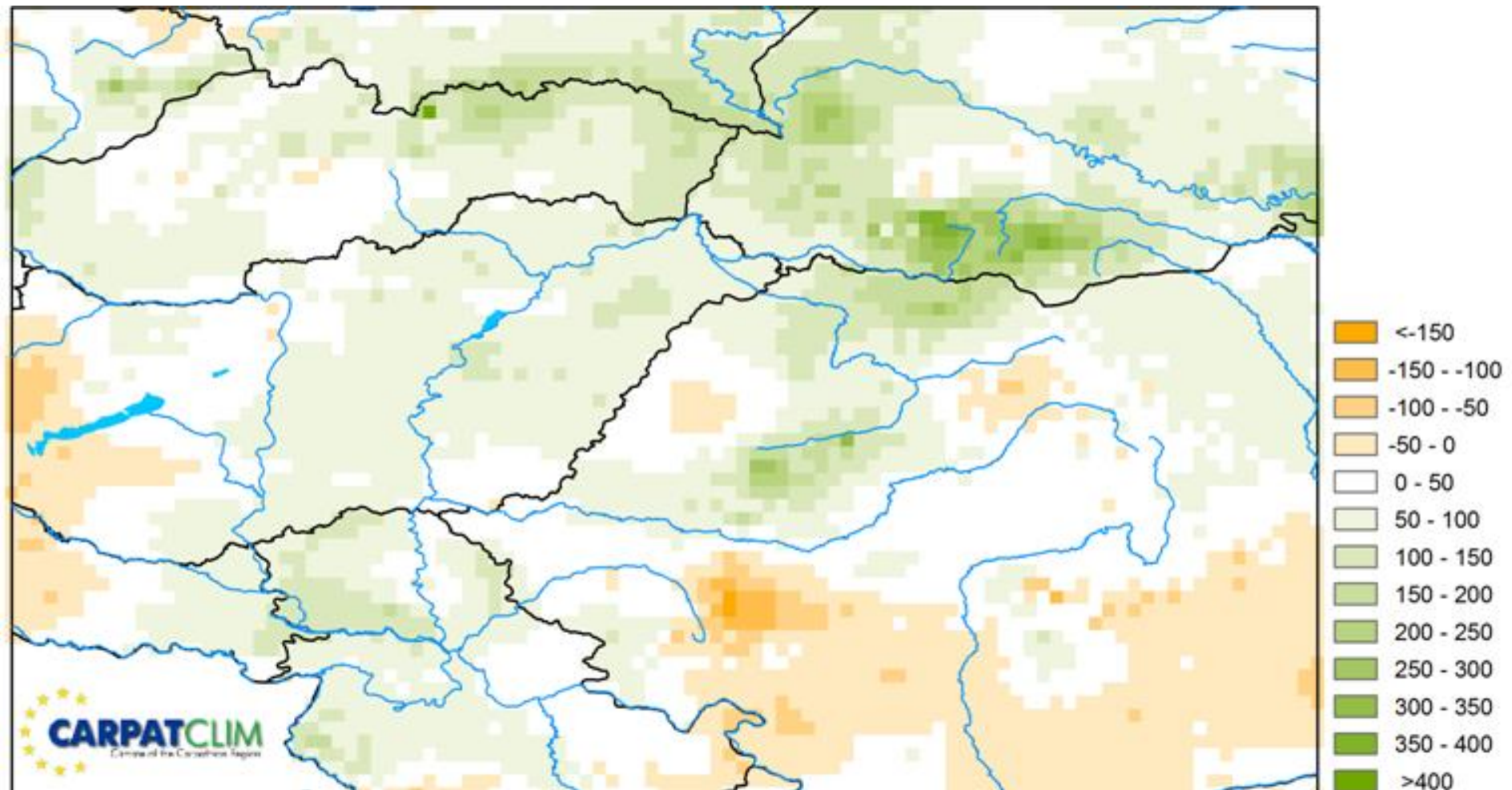
- High-resolution (10 km\*10 km) freely available databases
- Data availability on monthly and daily level
- Time frame: 1961-2010



# Annual average precipitation sum 1961-2010



# Change in the annual precipitation sum 1961-2010



# Benefits

- Improvement in the climate modelling
- Climate adaptation and vulnerability studies
- Strong development in the applied sciences
- Damage estimation, crop-yield forecast
- Development of early warning systems
- More accurate determination of crop sites
- Choosing of production sites, etc.

Thank you for your attention!